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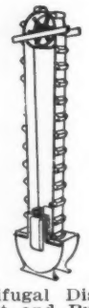
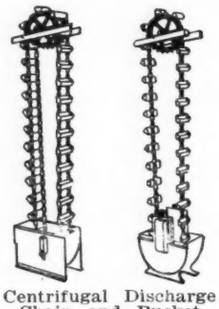
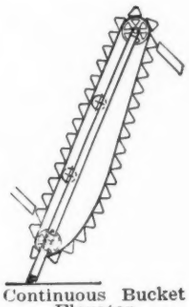


Centrifugal Discharge Belt and Bucket Elevator



Centrifugal Discharge Chain and Bucket Elevators

Positive Discharge Bucket



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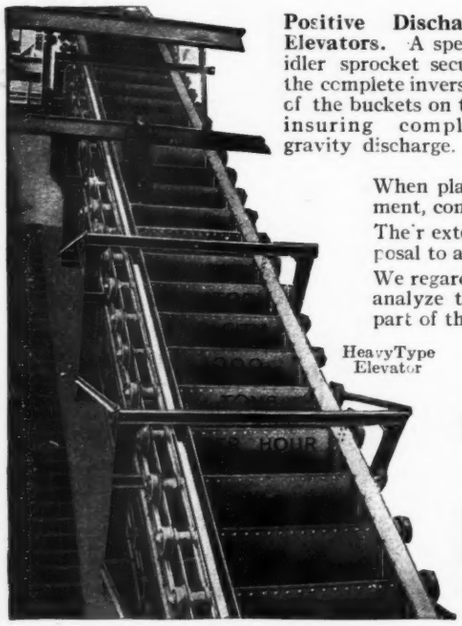

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Engineering and Mining Journal

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The Granby Mine at Anyox, B. C.*

By WAKELY A. WILLIAMS†

The Hidden Creek low-grade copper deposits in northwestern British Columbia have been developed on a large scale by the Granby company. Five separate orebodies have been outlined by diamond drilling and tunnel levels and are being mined by open-stope, milling and shrinkage methods. An attractive town site has been built and the organization is up to date in every respect.

THE MOST important events in the history of the mining industry of northern British Columbia to date have been the acquisition and development of the Hidden Creek copper mines, the erection of a smeltery to treat the ores, and the building of a town by the Granby Consolidated Mining, Smelting and Power Co., Ltd. This undertaking has had a stimulating effect both on prospecting activity and mining development along the whole northern coast.

Granby Bay, upon the northwest shore of which lies the town of Anyox, with its mines and smeltery, is a deep-water landlocked bay about 4½ miles long by three-quarters of a mile wide and is on the western shore of Observatory Inlet, 35 miles from its entrance. The distance from Prince Rupert is 110 miles and from Vancouver 550 miles. The surrounding mountains are steep and rugged and covered with timber. The mountains have been heavily glaciated and on the crests many glaciers can be seen at all seasons of the year. The Burnis-

*The first of a series of three articles describing the Granby Consolidated Mining, Smelting and Power Co.'s operations at Anyox, B. C. Succeeding installments will discuss the metallurgical problems at Anyox and the power plant and mechanical shops.

†Superintendent of smelters, Granby Consolidated Mining, Smelting and Power Co., Anyox, B. C.

ton range of mountains lies to the west, rising to an elevation of 5700 ft. and separating Observatory Inlet from the Portland Canal. Four creeks flow into the bay, having their source in this range of mountains, namely, Hidden Creek, Falls Creek, Bonanza Creek and Glacier Creek. The average weather conditions by months, as noted over a four-year period, are shown in Table I.

TABLE I. AVERAGE WEATHER CONDITIONS AT ANYOX, B. C.

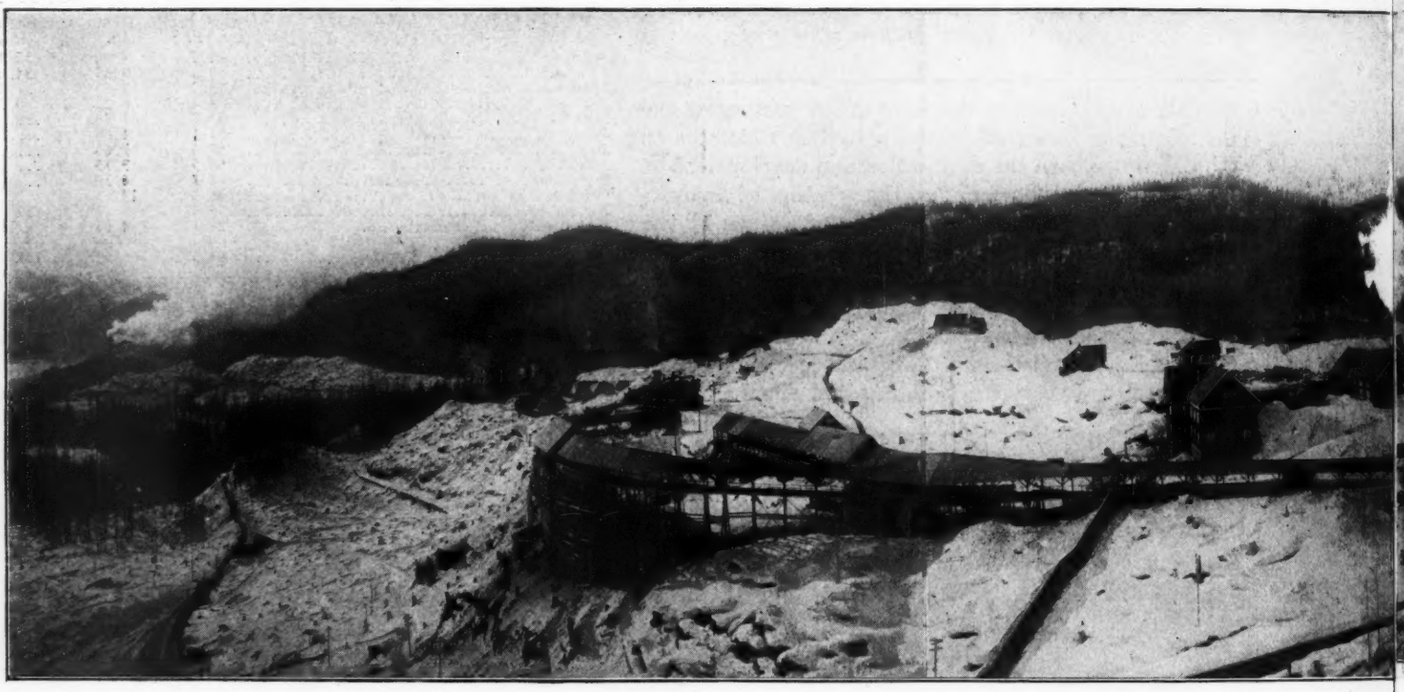
	Average Temp. Deg. F.	Rain In.	Snow In.
January	24.2	4.00	33.13
February	30.3	3.35	34.22
March	36.5	3.53	31.25
April	43.4	6.23	0.90
May	51.5	1.46	.....
June	57.1	1.84	.....
July	58.4	7.68	.....
August	58.5	3.73	.....
September	52.7	6.75	.....
October	46.3	14.63	2.25
November	35.3	8.47	32.89
December	29.1	4.65	47.79
Yearly	43.6	66.32	182.43

Standing on the deck of the steamer as it enters the bay and pulls alongside the docks, one is confronted with a busy scene. The docks are built parallel to the shore on account of the deep water. The depth of water is such that ocean-going vessels can dock at low tide.

SOME VIEWS OF THE GRANBY CONSOLIDATED OPERATIONS NEAR ANYOX, B. C.
Mine office, mess house and change house, Hidden Creek mines
Granby Bay Hotel at Anyox, B. C.; a modern and attractive haven for visitors

The tide has a maximum rise and fall of 23 ft. 4 in. The main dock, which is 800 ft. long by 50 ft. wide, is double-tracked and has three sets of traveling ore bunkers and unloaders. A 50-ton derrick is also installed for the handling of heavy machinery. Dock No. 2 is specially constructed with receiving bins, and belt conveyors convey the material from the outer or unloading wharf to these bins. A suitable track system upon which switch engines operate is arranged to handle the tonnage easily and connects all bunkers and wharves with the main line. The tonnage handled over the wharves during 1916 was 316,915 tons, consisting of coke, ore, limerock

and merchandise. At present there is under construction Dock No. 3 which is a continuation of Dock No. 1 and will be 590 ft. long and have two sets of traveling ore bunkers. In the construction of the docks creosoted piling has been used throughout, spaced 7 x 7 ft., heavily braced and with 12 x 12-in. caps, 4-in. stringers and 4-in. decking. The Granby company is affiliated with the Coastwise Steamship and Barge Co., of Seattle, to facilitate the handling of the large volume of freight and to have a reliable and regular means for transportation of supplies. In this service there are engaged a fleet of three cargo steamers, two tugs, eight barges and two scows of 1200 tons' capacity, carrying coke from Tacoma and Vancouver Island, general freight from Seattle and Vancouver, ore from outside properties of the Granby company and custom shippers, limerock from Swamp Point and quartz from Maple Bay on the Portland Canal. In addition the Granby company owns a number of smaller tugs and launches for local work. Apart from this service Anyox is the northern terminal for the three main coast steamship lines, namely, the Grand Trunk Pacific Steamship Co., the Canadian Pacific Railway, the Pacific Coast Steamship Co. and the Union Steamship Co. The companies each operate a weekly mail and passenger steamship service on a 40- to 50-hour schedule with Vancouver and Victoria, thus furnishing mail service three times a week.



GENERAL VIEW OF THE HIDDEN CREEK MINES OF THE GRANBY

The town of Anyox is built on the ground lying between the wharves, the smeltery and the mine. The streets are laid out to conform to the contour of the ground and at night are well lighted by electricity. The company maintains a modern 45-room hotel with steam heat, hot and cold water and telephone service in every room.

A completely equipped hospital with the latest X-ray apparatus is in charge of three physicians and a staff of nurses, so that every provision is made for taking care of the sick and injured. Moving-picture theater, dance hall, pool and billiard rooms are available for the recreation of the inhabitants. The company has a complete department store with grocery, dry goods, men's furnishings, hardware, furniture, drugs and meat departments, a modern refrigerating plant, and an up-to-date café. The prices charged are reasonable and about on a par with the prevailing prices of commodities in Vancouver. There are two schools in charge of three teachers to provide for the education of the employees' children, while three churches minister to the spiritual welfare of the community. For the accommodation of the single men the company has built two 2-story concrete fireproof rooming houses, illustrated on another page. In these rooming houses there are no hallways, every room having an outside door. The buildings are modern in every respect, having bathrooms, shower baths and lavatories; and each room has hot and cold water, steam heat and electric light. The boarding house, which seats 216 men, is a concrete building with all the latest improvements, such as cold storage, bake shops and laundry. A high standard of food is maintained and board is charged for at the rate of $1 per day and rooms at $5 per month.

Since starting active operations in 1912, a new mine town has been built, and no money has been spared to provide the most modern conveniences for the comfort of employees. This consists essentially of a change house, mess house, bunk house and 50 cottages, shown in the accompanying halftone engravings. The change house is a three-story, frame building with concrete floors on the first and second stories. The first floor is occupied by a locker room containing 300 steel sanitary lockers, a wash room where 50 men can wash at one time, a water-closet and urinal room, 24 shower baths, four porcelain tubs and a drying closet for clean clothes. The second floor consists of a pool room, a library and reading room, a shiftboss' office, an emergency hospital with four beds and a doctor's office. The third

story consists of a dance hall with the necessary cloak rooms. This building is heated by an Arco sectional hot-water heater. A hot-water tank holding 1500 gal. attached to a separate heater provides hot water for the shower baths.

The mess house is similar to the one near the smelting works except that it is of wooden-frame construction. The bunk house consists of three wings and is capable of holding 400 men. The heating plant is similar to the one in the change house. The cottages are all of modern construction, and each is equipped with porcelain bath, washbasin and water-closet. They also have hot- and cold-water connections and electric lights. The importance of the sanitary arrangements of the town, including sewer system, incinerators for garbage disposal and an adequate water system, is evidenced by the fact that sickness caused by the lack of these things is unknown.

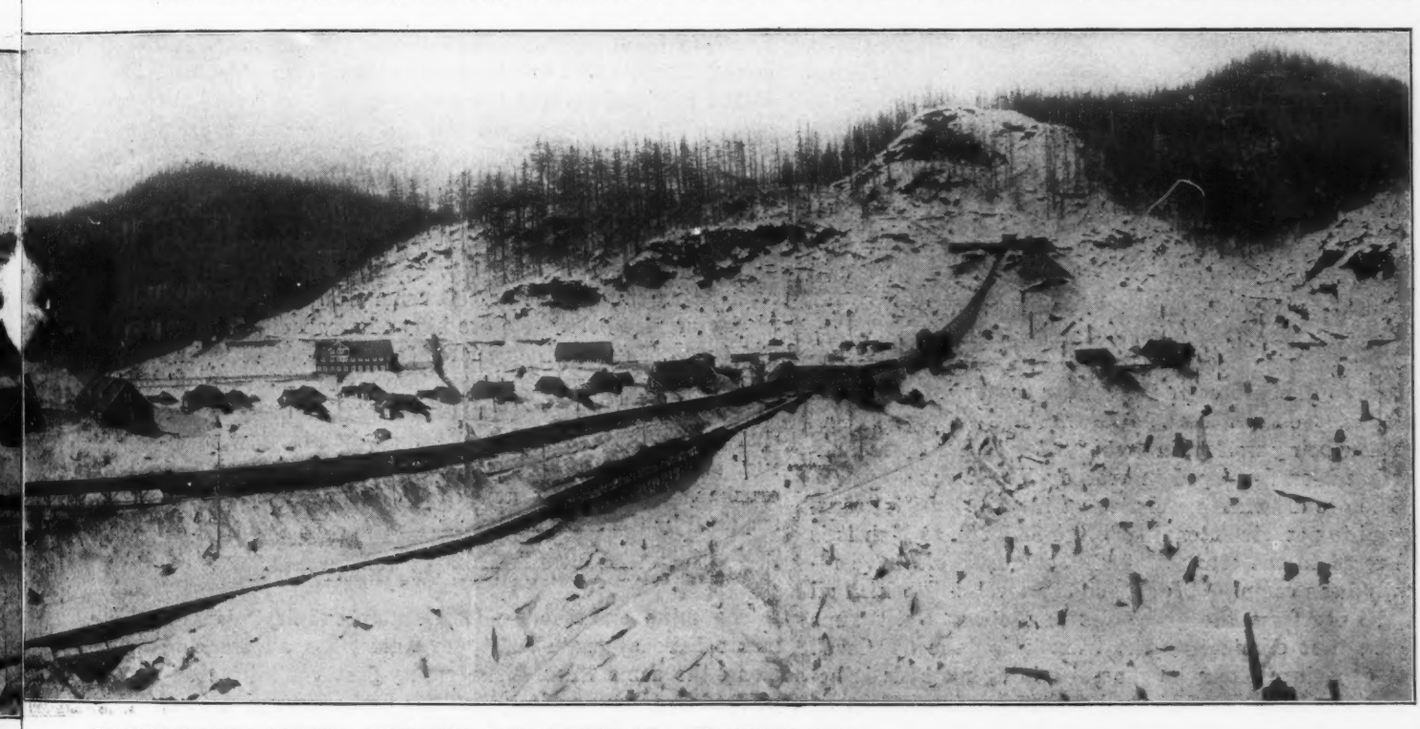
The Hidden Creek mine is a mile from tidewater and at the highest elevation is 900 ft. above sea level. The rocks in which the Hidden Creek orebodies occur consist of highly altered sedimentaries, including slates, schists and limestones. These rocks have been steeply tilted and in general lie at angles varying from 45° to 90° from the horizontal, and dip to the north. In the vicinity of the orebodies there is evidence of intense folding accompanied by faulting, both of which probably played a part during the period of deposition that formed the various orebodies. This sedimentary area is cut by a great variety of dikes, offshoots of the granitic intrusion flanking the area to the west and south. Some of these dikes show no evidence of having been the source of an enrichment of the ores through which they cut, whereas others show decided evidence of their influence in ore enrichment.

In the mineral-zone area slates are found on the southern and eastern sides more or less in contact with orebody No. 1. North and west of the slate is a zone 100 to 400 ft. wide, consisting of beds of siliceous material interbedded with occasional bands of limestone. In this zone are found orebodies Nos. 1, 4 and 5. To the northwest of this siliceous zone is an area of highly altered schist showing some epidote and chlorite, and in this area orebodies Nos. 2 and 3 occur.

Orebody No. 1, lying directly to the north of and in contact with the slate area, has a width varying from 100 to 250 ft., with an established length of about 1500 ft. The general dip of this orebody is about 75° NW, although in places, in following down the slate wall, the dip is reversed. This orebody outcrops at an average elevation of 900 ft., and ore is proved to extend to sea level.

Orebody No. 5, in the same general zone as that containing orebody No. 1, is a lenticular shoot which was discovered by the diamond drill and does not outcrop. It has a north-south strike and pitches steeply to the north.

Orebody No. 4 lies between orebodies Nos. 5 and 2 and is also included in the siliceous and limebed area. This orebody does not outcrop and like orebody No. 5, was found with the diamond drill.



CONSOLIDATED MINING, SMELTING AND POWER CO., AT ANYOX, B. C.

Orebodies Nos. 2 and 3 occur in the schist area and both have an extensive outcrop. The average elevation of the outcrop of these orebodies is 800 ft., and their continuity is established down to an elevation of 350 ft. Orebody No. 2 is a lenticular body about 400 ft. wide, 300 ft. thick and 700 ft. long, outcropping at the southern end and pitching to the north at about 45°. Orebody No. 3 is much smaller and is situated northwest of No. 2 and geologically in the same area.

The ore constituting orebodies Nos. 1, 4 and 5 is essentially a massive sulphide although in some parts of these orebodies siliceous zones with disseminated sulphides are found. Orebodies Nos. 2 and 3 have disseminated sulphides in a schistose gangue, with an occasional small lens of massive sulphide ore. There is little evidence of

oxidation or surface enrichment in the orebodies and unaltered sulphides appear at the surface. In Table II is shown a general analysis of the orebodies established by underground development work and diamond drilling. In mining, calculated proportions from each orebody are taken to make a mixture most desirable for smelting.

The Hidden Creek mine in its initial development was opened up by six tunnels, namely, the 150, 230, 385, 530, 630 and 700, which numbers are identical with the respective elevation of each tunnel level above sea level. Fifty thousand feet of diamond drilling was done prior to and contemporaneously with this first tunnel work. The diamond-drill cores established the general outlines of the orebodies and the tunnels served to develop them for mining at the most advantageous points. The haulage tunnels are the 630, 385 and 150. The 630 and 700 were driven to prospect the orebody No. 2 and are now used only as stope manways. The 230 level is used as a crusher level only. On this level ore from the upper levels is crushed and dropped directly into pockets extending to the 150 level, where it is drawn into railway cars for shipment to the smeltery.

Mining consists of open-stope or milling methods underground, and "gloryhole" or opencut work near the surface. Stoping was started first on the 530 level,

TABLE II. GENERAL ANALYSIS OF HIDDEN CREEK ORES

	Cu.	Insol.	SiO_2	Fe	CaO	S.	Al_2O_3	MgO
No. 1	2.37	25.8	22.4	29.6	4.7	30.0	5.1	1.3
No. 2	2.24	40.7	33.2	25.6	3.0	18.0	10.8	4.0
No. 3	1.82	48.8	40.8	21.6	1.5	7.9	11.5	6.6
No. 4	1.52	12.2	9.2	37.0	9.8	30.5	3.0	0.8
No. 5	3.02	16.1	14.8	34.0	5.9	33.3	1.6	0.0

extended to the 630 and 700 levels, and thence to the surface. These first stopes served as pockets from which the ore broken above was drawn. By extending several stopes to the surface and widening them at the top, two gloryholes of considerable size have been formed and are now being worked in orebody No. 2. An equal number has been developed in orebody No. 1.

The ore drawn from chutes on the 530 level is transferred to pockets extending to the 385, from which it is delivered to the crusher bins. Several raises have recently been completed from the 385 level, into which all of the ore from the gloryholes in orebody No. 2 runs direct, thus eliminating the transfer on the 530 level.

A departure from the general mining methods is being made below the 385 level and in those portions of the orebodies above the 385 level which do not outcrop and have a heavy overburden of rock to carry. In such places a system of shrinkage stopes is being developed which will give more support to the back and walls and make working conditions safer. The method adopted in a section now under way consists of shrinkage stopes 125 ft. wide, with a length equal to that of the orebody. Vertical pillars, 40 to 50 ft. wide, also across the orebody, are left between stopes.

A manway raise is driven through the center of each pillar to the surface, or to other workings opening to the surface. These manways serve for ventilation purposes and as entrances to the stopes. Manway drifts are driven from the pillar raises into the stopes at vertical intervals of about 30 ft. progressively as the raises are advanced upward. Drifts are driven under the stopes, and chutes are distributed so as to draw evenly the ore broken in excess of requirements for head room in the stopes. Each chute is equipped with a bulldozing chamber cut in the solid and without timber, as shown in an accompanying illustration. The manway to this chamber is equipped with an air line for use in drilling boulders.

Electric Haulage in Granby-Type Mine Cars

The present haulage system is equipped with 75-cu.ft., 24-in. gage, Granby-type cars, of which there are 54 in use, and five 6-ton, 500-volt Westinghouse bar-frame locomotives. On account of the recent increase in smelting capacity a change is being made in the haulage system on the 385 level which handles the total output to the crusher bins. Thirty cars of 140-cu.ft. capacity and 36-in. gage, and also two 12-ton Westinghouse locomotives of the bar-frame type, for pulling trains on the main line, are being installed; and two of the 6-ton locomotives are being altered to fit the wide gage for switching purposes underground. The rails used with the light equipment weigh 30 lb. per yd., while the new track is being laid with 45-lb. rails.

A duplicate crushing plant has been provided, so that either plant can take care of the maximum output. Crushing plant No. 1 is installed underground on the 230 level. Three crude-ore pockets extend from this level to the 385 and receive the run-of-mine ore from that point. This ore feeds directly into the crusher from which it can be diverted into either of two pockets extending to the 150 level. The Bacon-Farrell crusher used in this installation has a solid-cast frame and a crusher opening 36 x 42 in. The crusher is belted to a line shaft direct connected to a 150-hp., 2000-volt, Westinghouse alternating-current motor. Crusher No. 2 is installed at the surface below two ore bins of a capacity each of 250 tons. The ore from these bins is fed directly into the crusher from which it goes into pockets also extending to the 150 level. The crusher at this point has a cast-steel sectional frame with a 30 x 42-in. jaw opening, and it has a drive similar to that of the No. 1 crusher. The ore is crushed to 8 in. which is the size required by the smelting works.

Safety Committee Organizations

The mine and the smelting-and-mechanical departments have separate safety organizations all working along the same lines. The safety-first committee appointed to promote safety held its first meeting, Apr. 3, 1916, and has been followed by regular monthly meetings since. The committee is composed of the heads of the various departments, the superintendent acting as chairman. Each department head appoints a subcommittee of the men to act under him. Meetings are held every month, the personnel of these committees being changed every two months. Recommendations of the subcommittee are referred to the executive committee for approval. All workmen are urged to point out dangerous practices or unsafe equipment, and to offer suggestions for their rectification, which can be made direct to any committeeman, safety engineer, department head, or written out and placed in the "suggestion box," provided for that purpose. Subcommittees since the inception of the campaign have made 334 suggestions, 54 being placed in the boxes, and a great many made to the safety engineer.

First-aid instructions have been given to 65 men, 17 of whom have been awarded the class A, St. John's

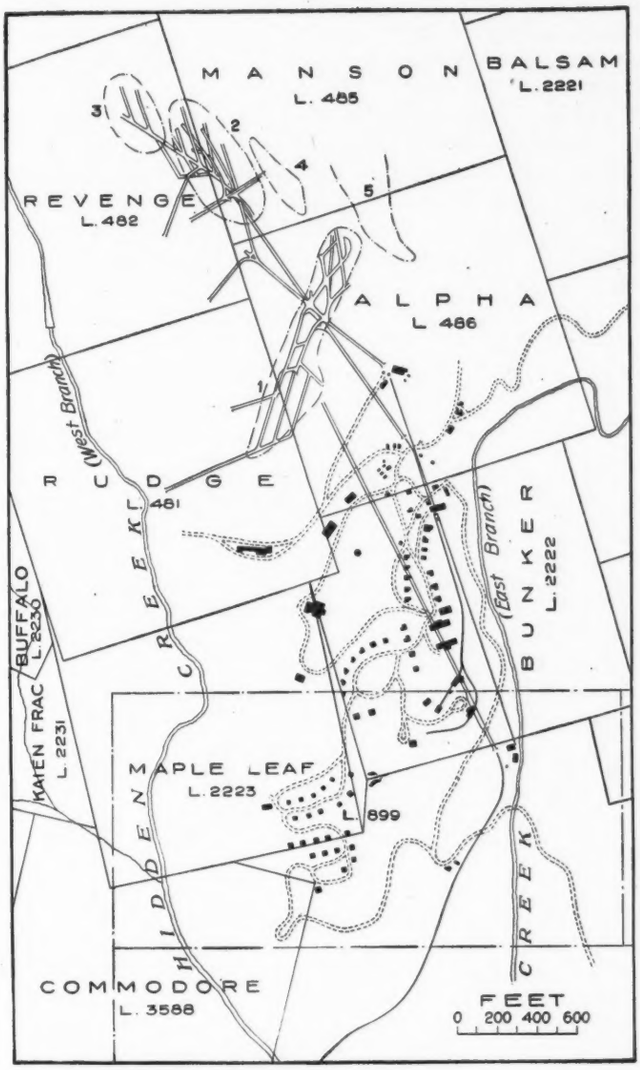


FIG. 1. COMPOSITE MAP OF HIDDEN CREEK MINES SHOWING RELATION OF OREBODIES NOS. 1 TO 5

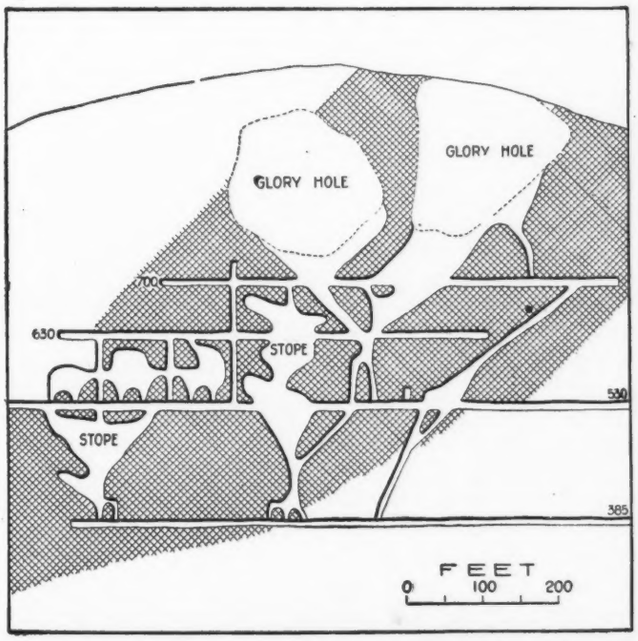


FIG. 2. TRANSVERSE SECTION OF OREBODY NO. 2

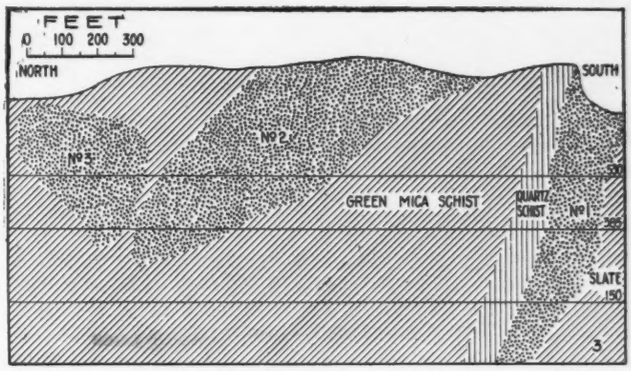


FIG. 3. GENERAL NORTH-SOUTH SECTION OF HIDDEN CREEK OREBODIES

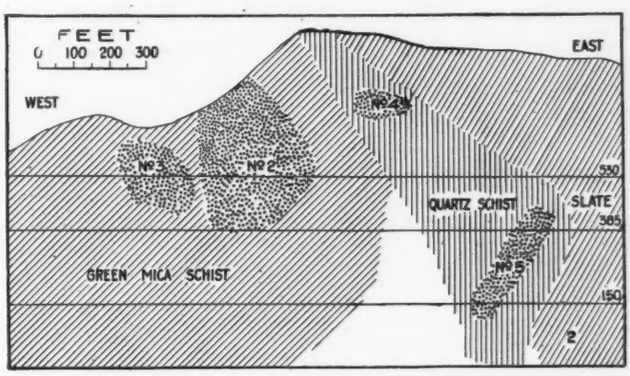


FIG. 4. EAST-WEST SECTION, HIDDEN CREEK OREBODIES

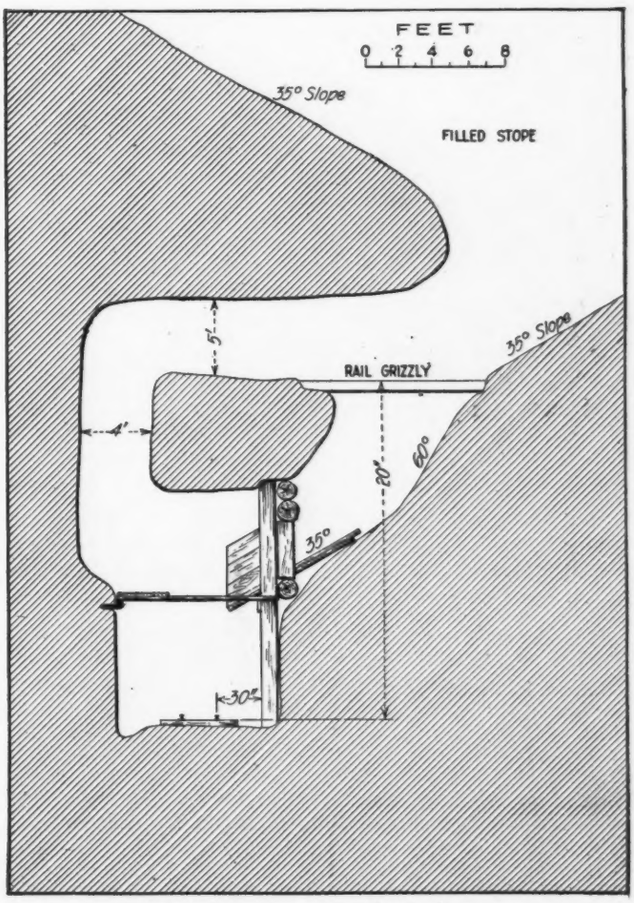


FIG. 5. SHRINKAGE-STOPE BULLDOZING CHAMBER

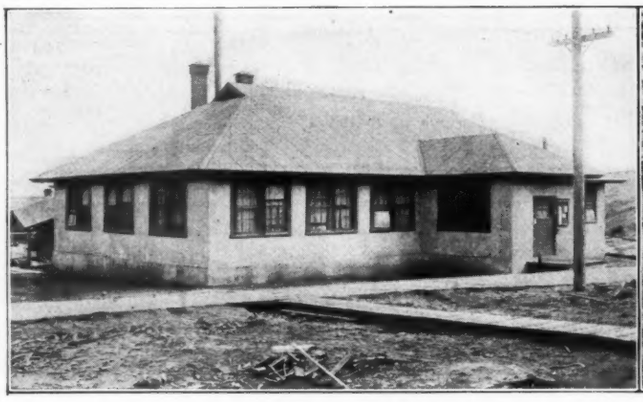
ambulance certificate. There are seven first-aid stations fitted up with all the necessary equipment, including stretcher, blankets, etc., and at the smeltery there is a type B pulmotor. It is aimed to render first aid to the injured men before they are sent to the hospital. A man gets only one dressing at the first-aid station, and must go to the doctor for future dressings.

Safety bulletins have been used extensively in educating the men, 14 boards being located in conspicuous places, and the literature posted being changed every two days. Letters on safety have been sent to the homes of all married employees every month or six weeks. Subforemen and straw bosses receive letters once in two months, aiming to impress them with the important part they are able to play in safety-first work. Danger signs are placed at dangerous places, such as railway crossings, powder houses, oil tanks and on all high-voltage wires, transformers, etc. Rules have been compiled and are enforced wherever possible. There was a 33% reduction in time lost per accident over that of the previous year. The three months of January, February and March, 1917, showed a reduction in accident cases, minor and major, reported for treatment at the hospital, of 64% over the same period of 1916. The periods compared are the most fair that could be taken, conditions being practically identical.

Fire prevention receives the attention of the safety organization also. Warnings are posted freely throughout the town and works and a large number of fire dangers have been eliminated. Pyrene protection has been installed in every building in the camp. A volunteer fire department has been organized. The general results of the campaign are undoubtedly good and the ensuing years promise a further large reduction in the number and severity of the accidents.

The head offices for the Western organization of the Granby Consolidated Mining, Smelting and Power Co., are at 813 Birks Bldg., Vancouver, B. C. The general manager and managing director, F. M. Sylvester, has his office at Vancouver, as has G. W. Wooster, treasurer of the company, who is also head of all accounting departments. In these offices are also the purchasing departments of the mines, smelting works and stores. Directly under the general manager is the superintendent of mines, O. B. Smith, who has charge of all mines and mining works of the company, and W. A. Williams, superintendent of smelters, who has charge of the two smelting plants and all metallurgical work. In direct charge of the smeltery at Anyox is A. J. Bone, to whom I am indebted for the major part of the metallurgical data in this article. I am also indebted to E. E. Campbell, who is in direct charge of the Hidden Creek mine and who has kindly furnished me with the foregoing interesting data relating to his department.

The smelting, converting and mining departments are each in direct charge of a general foreman, under whom are the shift bosses. All other departments are in charge of a general foreman, assistant and sub-bosses. There are about 1000 men employed at the Anyox unit, 450 at the mine and 550 in all other departments. Labor of all nationalities is employed, the majority of the men being British subjects.



GRANBY MESS HOUSE

COMPANY HOSPITAL AT ANYOX, B. C.

GRANBY COMPANY FAMILY COTTAGES

GRANBY BACHELOR ROOMING HOUSES

Mexico's Tendency Toward Confiscation

Recent legislation affecting particularly American mining interests in Mexico has been enacted by the Mexican Congress. On September 8, a bill was passed which provided for the temporary confiscation of industries not being operated. Prior to the passage of this bill, a communication, in the form of a circular signed by Aguirre Berlanga, assistant secretary in charge of the Department of the Interior, was sent to the governors of the Mexican states.

The circular reviews the situation, beginning with a statement of the right of the government to regulate industries affecting society, public power and national wealth. To the end that society may not suffer, it is asserted that the government must intervene to prevent interruption of work and suspension of various industries, by taking charge of enterprises where owners refuse to work them. The governors are ordered to report to the president enterprises within their states that have ceased to operate, in order that the Department of Finance may proceed to conduct operations with the understanding that the taking over by the government will last only while the owners are unwilling to resume operations.

The following translation of the circular of the Department of the Interior was sent to the *Journal* by a well-known mining company in Mexico.

Art. 27 of the Political Constitution of the United States of Mexico fixes the right of the nation to impose on private property such limitations as the public interest may demand, and in a special manner grants the authorities the right to regulate the useful employment of the natural elements, such as water, minerals and petroleum deposits. To such a principle must be subject the operation of the industries and all kinds of "negotiations" that create public necessities the satisfaction of which cannot be interrupted by the absolute liberty of the owners, as it is not lawful for any one to arbitrarily diminish the entire production of the social wealth, and much less when that production is not sufficient to supply the demand.

The enterprises that, by their nature, pass from the rank of a simple private interest to that of interests that affect society, the public power and the national wealth—such as the enterprises that have for their object the supply of water, railroad, telegraphic and telephonic communications, undertaking and light services, manufacturing concerns, mining enterprises and many others of a similar character, do not depend on the exclusive will of the proprietor because they are necessary for the satisfaction of collective necessities, and the activity or abandonment of these enterprises appertain to the common interest.

The conduct of the owners who close down their negotiations, or keep them idle, with the purpose of compelling the workmen to desist from a certain attitude, or with any other purpose not in accord with the general welfare, is openingly contrary to the sense of the chapter of the Constitution entitled "Of Labor and Social Welfare" and is manifestly in conflict with Fraction XIX of Art. 123 of the same Constitution, which prescribes that lockouts shall be lawful only when the excess of production makes it necessary to suspend work in order to maintain prices reasonably above the cost of production.

When the lockout injures the rights of society, diminishing wealth or stirring up difficulties to the public power, the temporary or definite shutdown violates the spirit and the letter of Art. 27 of the Constitution, which gives the government eminent dominion over property and control in its direct ownership, for the benefit of the community.

Recently, on account of the exemption of import duties on cloths granted by decree of July 19, for the relief of the poorer classes and in the exercise of the right vested in the sovereignty of the nation, several cloth factories, to the manifest detriment of society, of public order and of the working classes, have closed down in spite of the legal precepts that govern in the matter and notwithstanding that, by decree of Aug. 15, there was granted an exemption of duties on foreign cotton and that other manufacturers have already made use of this privilege to import the raw material mentioned and to push the work of their industries.

In order to prevent the lockouts of the negotiations, or to have those that have suspended resume work, to the end that society may not suffer disturbances by the stagnation of business and by not being able to fulfill its wants, the public power must intervene in an equitable manner. With this object, and with the object also of removing any chance of disturbance of the peace that may follow the interruption of work, the government sees itself in the inevitable position of being bound to take charge of the enterprises in those cases where the owners refuse to work. This official intervention, justified by public interest, does not in any manner tend to constitute a source of revenue for the government, to the detriment of private interests, so the proprietors, continuing in ownership, are to receive a profit from their negotiations.

The state of war in the country during the last years brought about the closing of many enterprises which have continued suspended, thereby increasing the difficulties that the government encounters to consummate the work of national reconstruction; and the recent lockouts of negotiations that were in operation, besides counteracting the work of reorganizing the country, with the economic curtailments that result from the stagnation of business, damage considerably the reserves of national capital.

Moreover, the owners, by frequently applying the lockout as a weapon against the workmen and an expedient to cause difficulties to the public power, incur in the grave offense against the public peace that has already been mentioned.

Therefore, the president of the republic has seen fit to resolve that I tell you, as I have the honor to do, to please advise this department with all opportunity in regard to the negotiations of public utility mentioned, within the state under your charge, and also of the enterprises that have already ceased to work, to the end that the Department of Finance may proceed at once to administer said negotiations that have already suspended, or may in the future suspend, their operations; with the understanding that the taking over by the government will last only while the owners are unwilling to resume operations.

I protest to you the assurance of my attentive consideration.

Constitution and Reforms, Mexico, Sept. 5, 1917.

The Asistant Secretary in charge of the Department of the Interior. (Signed) AGUIRRE BERLANGA.

Fractions XIX and XX of Art. 123 of the constitution read as follows:

XIX—Lockouts shall be lawful only when the excess of production shall render it necessary to shut down in order to maintain prices reasonably above the cost of production, subject to the previous approval of the board of conciliation and arbitration.

XX—Differences or disputes between capital and labor shall be submitted for settlement to a board of conciliation and arbitration to consists of an equal number of representatives of the workmen and of the employers and one representative of the government.

The following is a translation of the bill enacted by the Mexican Congress, Sept. 8, 1917:

Art. 1. The Executive Power of the Union is empowered so that, by means of the authority he may designate and until the Organic Law of Art. 123 of the Constitution is enacted, he may exercise the faculties to which Fraction XX of the same article refers.

Art. 2. The same Executive Power of the Union is authorized to take over the industrial establishments, and to administer them, in case of temporary or absolute shutdown of same that is not authorized by the constitution, with the understanding that this power will be exercised only for the time that the owners are unwilling to resume their interrupted operations.

Art. 3. The state legislatures are invited to issue a law similar to the present.

Battelle Furnace, at Battelle, Ala., has been sold by W. S. Rowe, of Cincinnati, to the Tata Iron and Steel Co. The furnace will be dismantled, the machinery and ironwork shipped to India and there set up on the company's property at Sakchi. The stack has been idle for 11 years. It is 85 x 19 ft. and has four Whitwell stoves for heating the blast. It was built to work the red hematite ore of the neighborhood, but was in blast less than three years.

Improving the Work of a Hancock Jig in Concentrating Lead Ore*

Experiments revealed that, with the overcrowding of a Hancock jig at Bonne Terre, Mo., an unnecessarily large amount of free gangue was passing through the jig screens. Tests were therefore made in an attempt to throw this excess gangue into the tails without raising the grade of the latter. A system of screens was finally adopted which, with careful adjustment of speed and stroke, gave the desired result.

THE following notes are taken from results obtained on a standard 25-ft. Hancock jig[1] during regular operation in the Bonne Terre mill of the St. Joseph Lead Co. in southeastern Missouri. The object of the tests was to determine the conditions for most effective work, and the nature of products that could be made.

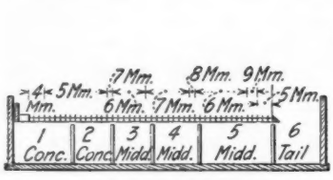
The material treated was sized between 9-mm. and 2-mm. round-hole screens, and was constant throughout the experiments. Three products were made: Concentrates from the first three hutches, middlings from the fourth and fifth, and tailings from the sixth. The middlings were crushed in one pair of Allis-Chalmers, Style B, 30 x 14-in. rolls, and elevated with the original ore to he 2-mm. screens, the oversize forming the jig feed.

While this arrangement was simple, it gave rise to undesirable crowding of the circuit. Table I shows tonnage and lead content of the jig feed and products at the beginning of the experiments, and brings out the excessively large amount of middlings, comprising 63.3% of the total material fed to the jig. The rolls, being heavily overloaded, did little crushing, a screen analysis of the product showing that only 27%, or 128 tons, was crushed fine enough to pass to the tables. The remaining 347 tons was returned to the jig with 400 tons of original ore. At times this overcrowding became much worse, and the tonnage in circuit grew to enormous proportions. It became imperative either to decrease the amount of middlings or to provide more crushing capacity, and experiments were begun along both lines. This paper deals only with the attempt to improve the work of the jig as then equipped.

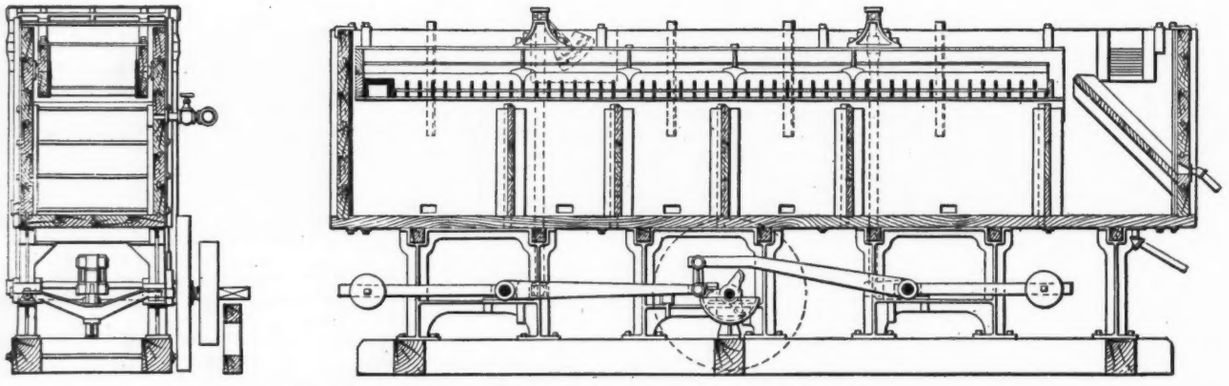
TABLE I. WORK OF HANCOCK JIG AT BEGINNING OF TESTS

Material	Tons per 24 Hours	Lead %	Lead Tons per 24 Hours
Feed	750.0	4.06	30.500
Concentrates	16.5	70.00	11.550
Middlings	475.0	3.50	16.625
Tailings	258.5	0.90	2.325

Before commencing the experiments a combined sizing and sorting test was made on an average sample of the jig feed. Tyler standard screens were used for the sizing test and all sorting was done by hand. Figs. 2 and 3 represent the result of this test graphically. The horizontal divisions in the diagrams represent the percentages of material in each size, and the vertical divisions the percentages of free galena, middlings, and free gangue as obtained by sorting. Areas, therefore, represent percentages of the total weight of sample. For instance, in Fig. 2 the length *AB* is 26% of the total length of the diagram and represents the amount of material between 6- and 8-mesh. The length *AD* is



System of Screens

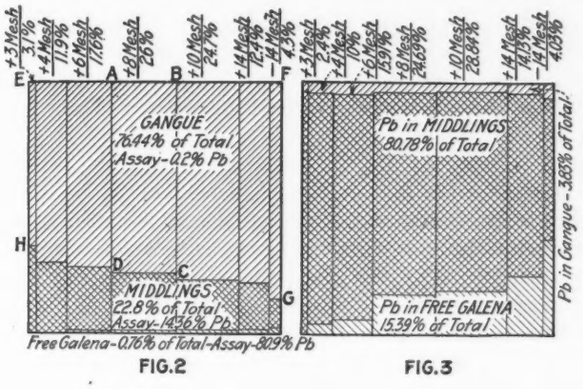


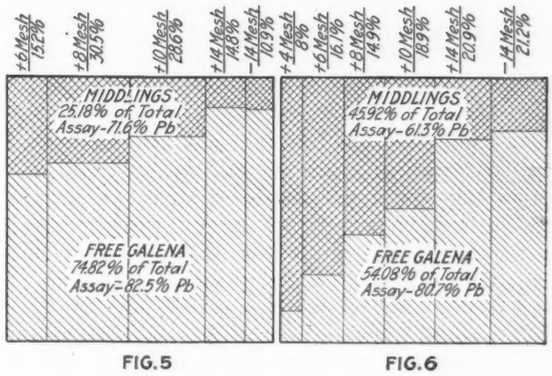
HANCOCK JIG AS USED AT BONNE TERRE MILL, MISSOURI

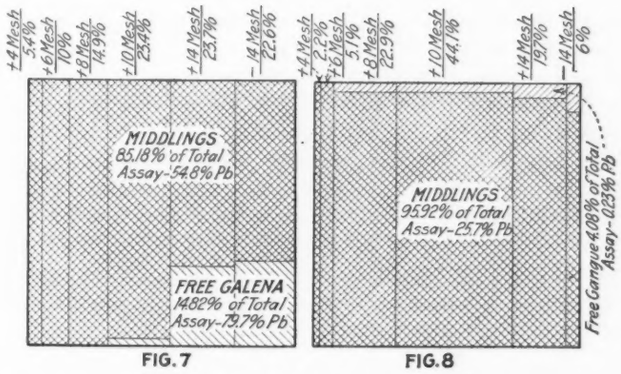
*Excerpts from a paper entitled "Hancock Jig in the Concentration of Lead Ores," by Harold Rabling, to be presented at the St. Louis meeting of the American Institute of Mining Engineers, October 8-13, 1917.

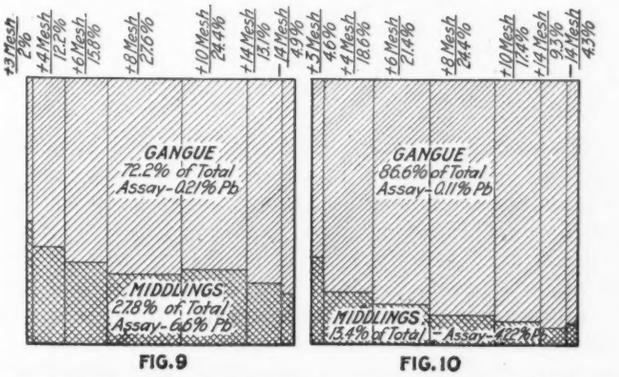
[1]For description of Hancock jig, see Transactions, A. I. M. E., Vol. 47, 213.

76.65% of the total height of the diagram and represents the percentage of the 6- to 8-mesh material, which occurs as free gangue. The area *ABCD*, therefore, shows the percentage of the total sample occurring as free gangue between 6- and 8-mesh and is equal to 19.927% of the total area of the diagram, while the area *EFGH* shows the total amount of free gangue in the sample, or 76.44 per cent.









GRAPHIC REPRESENTATION OF SCREEN ANALYSES

Fig. 2—Jig feed. Fig. 3—Lead in jig feed. Figs. 5 to 9—Products of first to fifth hutches respectively. Fig. 10—Jig tailing

The results obtained by this test led to the belief that it was possible greatly to reduce the tonnage of hutched product without affecting the grade of tailings. Table II, worked out from the results of the sorting, shows the work that might be expected from a theoretically perfect concentrating machine, and differs considerably from the record of the actual work obtained (Table I). An unnecessarily large amount of free gangue seemed to be passing through the jig screens, and a sorting test on the jig products confirmed this, the fifth hutch containing almost as much free gangue as the tailings. In the investigations following the above work special attention was given to the possibility of decreasing the amount of gangue being hutched with the middlings.

TABLE 2. THEORETICALLY PERFECT WORK OBTAINABLE ON MATERIAL FED TO JIG

Material	Tons per 24 Hours	Lead %	Lead Tons per 24 Hours
Feed	750.00	4.06	30.500
Concentrates	5.70	80.90	4.753
Middlings	171.00	14.36	24.600
Tailings	573.30	0.20	1.147

Factors Affecting Operation of Jig

The following factors may be taken as having most effect on the work of the Hancock jig: (1) The speed of the jig. (2) Length of vertical stroke. (3) Length of horizontal stroke. (4) Depth of bed. (5) The size of the grains forming the bed. (6) The specific gravity of the grains forming the bed.

The speed of the jig was varied between wide limits—from 170 to 210 strokes per minute. The high speeds gave increased tonnage of hutch product and were objectionable from a mechanical standpoint. At the slow speed of 170, difficulty was experienced in keeping the bed moving freely, it having a tendency to pack and lose its quicksand effect. A speed of 190 to 195 strokes per minute was finally decided on as the most desirable.

The length of vertical stroke, by affecting the pulsion and suction velocities, affects the tonnage of hutched product, increased length causing more material to be hutched, and vice versa. It varies between $\frac{3}{8}$ and $\frac{3}{4}$ in., the adjustment being made by the operator according to the lead content of the material treated.

The horizontal stroke should be as long as possible, in order to have, above the bedding, a thin layer of ore. In treating large tonnages the long stroke is particularly desirable, the improved separation in a thin layer more than compensating for the shorter time the material is under treatment. A minimum horizontal stroke of $\frac{3}{4}$ in. is used at Bonne Terre, and it is probable that greater capacity could be had by making the stroke much longer.

The depth of bed on the Hancock jig is determined by the height of the slats above the screen. No experiments were made with variations of this distance, all the jigs being operated with 3 in. of bed depth. The size and specific gravity of the grains forming the bed are determined entirely by the size of the jig screens. No artificial bedding was supplied at any time, as experiments have shown that with a carefully designed system of screens any desired bed can be produced and held, relying on the ore to supply all the material necessary. The nature of the bed being the most important

factor influencing the work of the jig, the main part of the investigation was taken up by the effort to work out a system of screens that would give satisfactory work under average conditions and be flexible enough to take care of extreme variations in the grade and nature of the material treated.

The system that was finally evolved is given in Table III, and, while it would probably be applicable only to the Bonne Terre ore, the principles of its evolution may be found useful in the solution of similar problems elsewhere.

TABLE III. SYSTEM OF SCREENS USED ON HANCOCK JIG

4-mm. round hole to	rib 3	(3 ribs)
5-mm. round hole to	rib 15	(12 ribs)
7-mm. round hole to	rib 16	(1 rib)
6-mm. round hole to	rib 22	(6 ribs)
7-mm. round hole to	rib 30	(8 ribs)
8-mm. round hole to	rib 31	(1 rib)
6-mm. round hole to	rib 41	(10 ribs)
9-mm. round hole to	rib 43	(2 ribs)
5-mm. round hole to	rib end	(3 ribs)

Close examination of the jigs brings out the following points:

1. Stratification of the material into layers of varying richness takes place almost immediately after it reaches the tray. This is helped by the strong pulsion effect on the first hutch, where suction is minimized by the fineness of the bed of free galena which lies in a heavy mass on the screen.

2. In order to remove all the material containing lead, both as free galena and middlings, a bed is required that gradually decreases in specific gravity with increasing size of grains. This was found to be most effectively obtained by arranging the tray with an occasional row of large holes to take out the bedding in steps.

3. The bed may be likened to a screen having holes of different sizes, the size depending on the size of the grains. Any section should be just long enough to give a good "screening efficiency" on such material as will pass through it. For instance, a bed composed of grains of specific gravity 4.0 will hutch a product assaying about 40% lead. If it be found that all the 40% material present will pass through in a length of 2 ft., there is a loss of efficiency by extending this particular bed any farther than 2 ft. A row of large holes at this point will allow the heavier particles to pass through, leaving a bed of lighter specific gravity for the next section of tray. A bed which changes rapidly in character will therefore allow all parts of the jig to do equal work, and give maximum efficiency.

4. There are two distinct operations to be considered. First, the making of clean concentrates, and, second, the making of clean tailings. These are justly considered apart, and of the two the latter is by far the more difficult. The specific gravity of galena is 7.40 and of gangue 2.80, and while the separation of these two minerals is easy, the material received on the jig is made up of grains ranging from one extreme to the other. By sorting the products of the jig it was found that concentrates are made up of grains of free galena of grade 82.3% Pb, and middlings of 60.4% Pb. Specific gravities are 7.00 and 5.20 respectively: a difference of 1.80; tailings are made up of middlings of grade 4.91%, or specific gravity 2.95, and gangue of grade 0.14%, or specific gravity 2.82, a difference of 0.13. These figures illustrate the wider range of specific gravity permissible in concentrates, and therefore the relative ease of separation of the high-grade material.

5. The small amount of free galena present helped to simplify its separation, and it would appear to be good practice to hutch the free galena in as short a distance as possible, reserving the greater length of the tray for the more difficult work of separating middlings from tailings. An attempt to do this was successful, and concentrates are now made on only two hutches, occupying 80 in. of screen length. The larger part is caught in the first hutch, the second acting as a safeguard to prevent free galena being carried over into the middlings hutches. As a general rule the tonnage of product from the second hutch is small.

6. The separation on the final section of the tray, or the part over the fifth hutch, must necessarily be rough, owing to the low grade of the middlings remaining, and the small difference in specific gravity between it and the free gangue. The bed consists of large-size grains of low-grade middlings, and the heaviest tonnage of hutched product is made here. At the end of the fifth hutch two ribs of holes, large enough to take out all the remaining bedding, are used.

7. Variations in grade of the feed introduce complications that must be allowed for in the screen layout. An excess of bedding material, due to higher-grade ore than usual, causes an accumulation of heavy grains that cannot pass through the screens, while low-grade ore will allow the bed to become too light and the hutched product will contain too much gangue. By arranging the screen to take out the bedding in steps, as mentioned before, such an accumulation cannot extend very far, but extreme variations are best taken care of by the operator who shovels off excess bed and plugs the large holes in the screen when bedding material is scarce.

8. Wire cloth and punched plate were both tried for the jig screens, with a final decision in favor of the latter. While it is sometimes claimed that wire cloth gives less trouble by blinding, it was found in these tests that there was little difference in this respect, while punched plate had the advantage of being more easily cleaned.

The nature of the products obtained with the screen system given in Table IV is shown in Figs. 5 to 10. The first two hutches produce good concentrates, the third and fourth a rich middlings, and the fifth a low-grade middlings containing a large proportion of free gangue. Analysis of the tailings shows some middlings present hardly worth recovering. Table IV shows results of a tonnage test on the jig, equipped with the screen system given in Table III.

TABLE IV. WORK OF HANCOCK JIG UNDER PRESENT CONDITIONS

Material	Tons per 24 Hours	Lead %	Lead Tons per 24 Hours
Feed	505.0	4.74	23.95
Concentrates	7.7	75.00	5.79
Middlings	195.0	8.16	15.91
Tailings	302.3	0.74	2.25

The rolls in this section of the mill have a feed of 195 tons per 24 hours, of which 58%, or 113 tons, is crushed fine enough to pass through 2-mm. screens. The remaining 82 tons is returned to the jig with 423 tons of original ore. The lighter load on the jig enables it to do better separation, and cleaner concentrates and lower tailings are possible. Subsequently the tonnage of ore treated in the mill was raised from 1800 to 2200 tons per day without extra jig equipment, and with lower tailings than previously, the gain being almost entirely due to the more efficient work done by the jigs.

Alaska Juneau 1520-Ft. Raise

By C. K. WHITE*

A two-compartment raise, inclined at 56°, was driven from one level, and without intermediate connections, 1520 ft. in 363 days at the Alaska Juneau mine. Ventilation was secured by means of an exhaust fan assisted by compressed-air jets set inside a 15-in. pipe. Cost of the raise was $26.33 per ft., including overhead.

THE No. 2 main raise in the Alaska Juneau mine was started at a point on the No. 4 level, the elevation of which is 450 ft. above the sea, and 80 ft. south of the intersection of the Nugget Gulch and the Silver Bow faults. These faults have been found to be the southern and western limits of the orebody which was to be developed. The Nugget Gulch

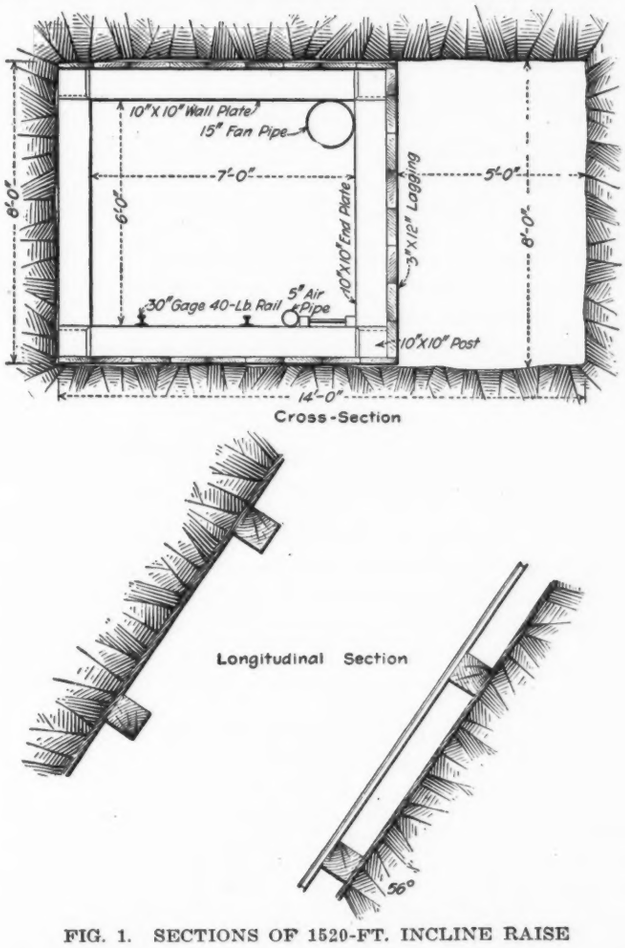


FIG. 1. SECTIONS OF 1520-FT. INCLINE RAISE

fault strikes N 37° W and dips 60° to the northeast; the Silver Bow fault strikes N 80° E, and dips 70° to the northwest. The line of intersection of both planes bears S 48° 30′ W, making an angle with the horizontal of 56°. The raise was driven on a 56° pitch parallel to this line, the purpose being to keep the raise in the foot wall at a uniform distance from the orebody at all times. Levels were provided at intervals of 250 ft. measured vertically, the topmost level being No. 00 at an elevation of 1700 ft. On this level a drift 350 ft. in length was connected to the surface, thereby completing the ventilation circuit for the mine.

The raise, which is 8 x 14 ft. outside dimensions, is divided into two compartments, a chute compartment 5 x 8 ft., untimbered, and a skip compartment, 6 x 7 ft., inside of timbers. Fig. 1 shows a cross section of the raise and Fig. 2 the details of the timber set used.

Work started, with three shifts per day on Aug. 25, 1915. Squaring up for the start and driving the chute raise occupied nearly one month, and the start on actual raising was made on Sept. 26. The work was performed continuously and completed on Nov. 12, 1916. A total of 1520 ft. was driven and at intervals of 250 ft. vertically, or 300 ft. on the slope, chute raises and stations for four working levels were made. On Dec. 23, 1915, the working schedule was changed to two shifts but on Sept. 3, 1916, returned to three shifts. The change to two shifts was made in the interest of economy but necessity for ventilation in the mine made speed the important factor and three-shift schedule was resumed. The best month's progress was made within a month from completion, when a distance of 169 ft. was driven.

The crew employed in driving the raise consisted of five machinemen on each shift and one timberman, the latter working only when the raise crew were placing timbers in the raise. He was called upon at any time, regardless of shift time, when the raise men were ready to place a set. This arrangement worked out satisfactorily. The wages paid the men in the raise were: Leader, $4 and $4.50; machinemen, $3.50 and $4; timbermen, $4 and $4.50. The increase was given when the raise became exceedingly wet, as it was for part of the time. The raise work came under the supervision of the shift boss on duty in that section of the mine.

General Cycle of Operation

The general cycle of operations as practiced was as follows: Starting with the face one round ahead of the bulkhead, in medium hard ground, the next round was drilled with four Ingersoll-Rand CC 11 Stope-hammer machines in operation and one man packing steel, etc. A round consisted of from 28 to 34 holes, the number drilled depending on the hardness of the ground. Tools, etc., were placed below the bulkhead and the cut holes, which were placed directly over the chute compartment, loaded and blasted. The rest of the round was then loaded and blasted. This would advance the face to about 12 ft. above the bulkhead. Staging was then built, the next round drilled and only the cut holes blasted. The muck was then removed from the bulkhead, the latter taken away and two sets of timber placed, thereby raising the bulkhead to within perhaps 2 or 3 ft. from the face. The rest of the round was then blasted, completing one cycle of operations for the advancement of the raise a dis-

*Alaska Juneau Gold Mining Co., Juneau, Alaska.

tance of two sets. The practice of shooting the cuts and the round separately was far more satisfactory and economical than shooting all holes at once. Occasions occurred when the cuts did not break on the first shooting. Had this occurred when shooting the whole round at once, the round would have been lost. The bulkhead consisted of 8 x 8-in. timbers placed side by side on the top of the last set of timbers. When the ground was soft, a set would be placed after each round, or as soon as there was room.

Air was supplied at 90-lb. pressure and was delivered to the top of the raise through a 5-in. pipe line. Ventilation was secured by means of a 15-in. fan pipe, carried in the upper right-hand corner of the skipway

MONTHLY COSTS AND STATISTICS OF No. 2 RAISE

Month	Feet Driven	Total Cost	Cost per Ft.	Machine Shifts	Feet per Machine Shift	Days Driving	Interruptions Chute Raises Days	Chute Raises Feet	Stations Days	Stations Feet
1915										
Aug.	25	$333	$13.32	24	1.04	5	2	15	0	0
Sept.	35	853	24.36	50	0.70	9	2	16	20	..
Oct.	159	3,305	20.78	160½	0.99	31	0	..	0	..
Nov.	102	2,695	26.42	105½	0.97	20	3	35	7	61
Dec.	150	2,781	18.54	199½	0.75	31	0	..	0	..
1916										
Jan.	85	1,970	23.18	116	0.73	27	4	21	0	..
Feb.	71	1,471	20.72	78	0.91	13	1	10	14	65
Mar.	130	2,576	19.81	162	0.80	31	0	..	0	..
Apr.	116	2,562	22.09	161	0.72	30	0	..	0	..
May.	30	1,210	40.36	58	0.52	13	6	35	12	41
June	86	2,662	30.95	168	0.46	30	0	..	0	..
July	96	2,828	29.46	148	0.65	31	0	..	0	..
Aug.	105	2,821	26.87	152	0.69	27	4	35	..	..
Sept.	113	2,604	23.04	181	0.62	22	0	..	8	34
Oct.	169	2,978	17.62	228	0.74	31	0	..	0	..
Nov.	48	1,965	40.95	56	0.85	12	0	..	0	..
Totals	1,520	$35,622	$23.43	2,047½	0.75	363	22	167	61	
Survey	....	652	.....	.....	....	..	..	..	..	..
Insurance	....	382	.....	.....	....	..	..	..	..	..
Timber	....	3,368	.....	.....	....	..	..	..	..	..
Total cost	....	$40,024	$26.33	.....	....	..	..	..	..	..

Average holes drilled per machine-drill shift, 4.72.
Average feet drilled per machine-drill shift, 32.74.

compartment, with ¼-in. air jets inserted at intervals. These jets, supplied with compressed air from the line, were inclined downward inside the ventilation pipe, thereby creating a suction at the face. Only two jets were necessary in the entire length of the raise. After blasting, the jets were aided by placing the air hose, with valve partly open, in the top of the pipe, allowing air to blow downward. The top of the pipe was kept as close to the bulkhead as was possible, using 25-ft. joints of pipe. At no time was the work interrupted with powder-gas troubles, the men being able to return to the face within 30 min. after blasting. The powder

COST SEGREGATION OF COMPLETED No. 2 RAISE

Account	Total Cost	Cost per Ft.	Per Cent. of Total
Labor	$19,350	$12.74	48.40
Powder	4,936	3.25	12.34
Fuse and caps	656	.43	1.63
Compressed air	3,563	2.34	8.89
Drill steel	408	.27	1.02
Machine-drill supplies	649	.43	1.63
Mine supplies	918	.60	2.28
Timbers	2,925	1.92	7.29
Miscellaneous lumber	156	.10	.38
Ladders	286	.19	.72
Sharpening drill steel	1,338	.88	3.24
Train service	744	.49	1.86
Hauling men	337	.22	.84
Shiftbosses, foreman, surveying, etc	652	.43	1.63
Insurance	382	.25	.95
Superintendence and general expense	2,717	1.79	6.80
	$40,024	$26.33	100.00

smoke was discharged into the main tunnel, which is ordinarily well ventilated and only 60 ft. from the bottom of the raise.

The work was started by using a small air-driven hoist with 5 x 8-in. cylinders and a 14-in. drum capable of holding 1100 ft. of ⅝-in. cable. On Aug. 6, 1916, when the raise was near the 1100-ft. mark, this was displaced by a Vulcan D-143 (Hendrie & Bolthoff) air-driven hoist, with 9 x 10-in. cylinders and 35-in. drum capable of holding 1600 ft. of ¾-in. cable. The sheave was placed across bolted timbers, supported by the hanging-wall and foot-wall plates. After an advance of from four to six sets in the raise the sheave was moved up to the top set but one, making it necessary for the men to walk not over 40 ft. in getting to the face. In moving the sheave, after extending the track to the bulkhead, the cable was first removed from the sheave, blocking the skip in the raise and signaling for loose brakes on the hoist. The bight was then pulled by means of block and tackle to the top set. The sheave was likewise pulled to its new position and the cable placed upon it. A Little Tugger hoist, mounted on a column, was used for hoisting this sheave and cable, when the cable became long.

In connection with the accompanying tables of cost it is pertinent to note that labor was not scarce at any time during the job, and that the length of shift

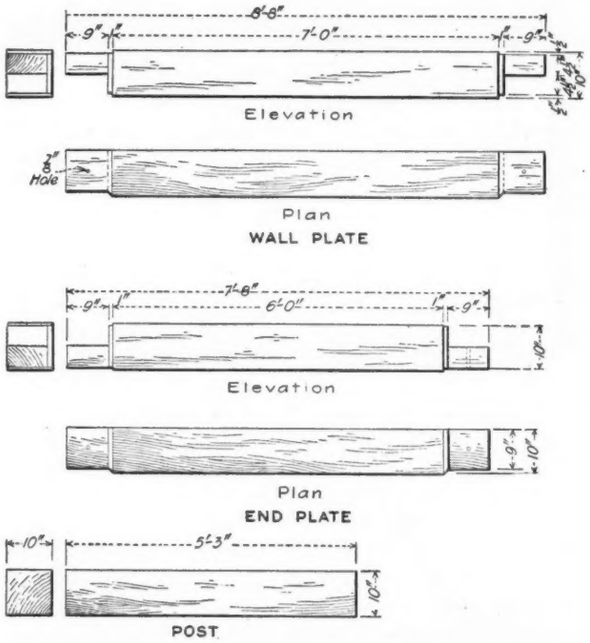


FIG. 2. DETAILS OF TIMBER SET IN RAISE

was eight hours. Powder used throughout was No. 2 Dupont 40% ammonia dynamite. The total amount used was 37,977 lb., or 25 lb. per ft. of raise driven. No. 8 California blasting caps with 1¼-in., 40% Dupont Nitro Primer powder, and No. 6 caps with 70% Nitro Primer powder, were used with equal success, so far as could be noted. The Bear brand of fuse was used.

The proper proportion of the cost of operating the mine compressor, a 4000-cu.ft. type P.R.B. Ingersoll-Rand was charged to the raise, the basis of the charge being the unit cost per machine-drill shift. A smaller 800-cu.ft. compressor (Ingersoll-Rand, Imperial type) was run between shifts during the two-shift period in the raise, for the purpose of clearing the mine of powder smoke. During the period of driving the raise there were about 30 machine drills in use. The various mine and general expenses were distributed in the usual manner. Insurance charge was 2.75% of payroll.

Some Observations on Arizona Strikes

By CHARLES F. WILLIS
Director, Arizona State Bureau of Mines, Tucson, Ariz.

Suggestions for the solution of the existing unrest among mining communities are discussed. The providing of satisfactory conditions, recreation and education are all considerations worthy of study by the mine operator.

DURING the last few weeks I have had the opportunity of studying the situation in various mining camps of Arizona where strikes have occurred. Although the strikes in the various camps have been conducted differently, it was very interesting to note the common factors, the methods of handling the strikes taken by the strikers and the companies and the results as we have them today.

At Bisbee, Ariz., the strike was distinctly an I. W. W. disturbance. At no time were the mines completely shut down, although after alleged intimidation the low point was reached two days after the strike was called, when but 30% of the men reported for work. From that time on there was a continual gain in the percentage working. On July 12, by one sudden swoop, the sheriff, Harry C. Wheeler, and 1200 deputies deported an equal number of I. W. W.'s and sympathizers. Since that time the district has been closed to men with the red card. Production has been steadily increased; men are being put on as fast as possible, although the shortage of labor all over the country is also having its effect upon the mines, and it will probably be some time before they regain their normal capacity. Everything is quiet, however, and while there has been a certain tenseness in the air that is gradually disappearing.

Conditions at Jerome were similar in many ways, although when I. W. W.'s were being sought for deportation, there were found to be less than one hundred. One hundred men had faced a strike in a camp of six thousand, and with the deportation of these men the camp was at peace again.

Months of Trouble at Clifton-Morenci

The situation at Clifton-Morenci was more like a real strike than at any other place. Almost two years ago a four months' strike occurred in the district, which was finally settled by concessions on the part of the mine operators. In the 17 months following the settlement there were 17 other strikes, all of which were small, involving but a few men, but they were so constant and so regular that it became necessary to have a definite understanding and settle the policies once and for all. At this camp the labor is largely Spanish and Mexican; they are striking for Miami scale of wages and Miami conditions.

In the Globe-Miami district, shortly after the strike was called, which was a combination I. W. W. and American Federation of Labor strike, the feeling was so tense that it would have taken but little to have caused bloodshed. Fortunately the governor of Arizona, Thomas E. Campbell, witnessed some of the demonstrations, and soon afterward troops were sent into the district. From that time on public gatherings were prohibited, and while the district was not under martial law, it was certainly under martial police. After a considerable period of occupation by the troops it was announced that those who wished to return to work could do so and be assured of ample protection. Many returned although none but American citizens are being given employment. In all of these camps the sliding scale of wages, based on the price of copper, has been maintained and, in fact, all other conditions that existed previous to the strike.

Changing Demands of Strikers

The demands of the strikers in the various districts of Arizona are varied and long, including $6 a day, irrespective of the price of copper, a six-hour day, grievance committees, hospital control, recognition of the union, and numerous other things. It is remarkable to notice, however, that during the agitation preliminary to the strikes these things were not in particular evidence but rather were excess profits, anti-Government agitation, the draft, the high cost of living, the war of capital and such things. It has been wondered by many if the high price of copper and the urgent need of the Government for it did not lead the strikers to believe that they could force a settlement in which they would gain their demands. This may have been the case but it is considered by many others to be doubtful.

It is no secret that it has been believed that an industrial war, a war of capital and labor, was coming. For many years unrest has been growing—a feeling of lack of security. Few thought that this war of capital and labor, which in reality means strikes, would come at this time, it being generally believed that it would come at the conclusion of the world war with the lower price of copper and the consequently lower wages. It was precipitated earlier than was anticipated, however, by I. W. W. propaganda, anti-Government demonstrations, and the fact that so many of the workers in the mines are citizens of the countries with whom the United States is at war.

The questions that should be studied are not the justice of the demands, whether or not a six-hour day would make for more efficiency than an eight-hour day, or a $6 daily wage should be paid, for these are obviously not the real trouble. I doubt if anyone could put his finger on the real trouble. The question in which we are interested is: What is back of it all? Why the start and growth of the feeling of unrest? What is the condition of the man's brain that makes him listen to the chatter of the agitator, and why the receptive state of that brain? These are the real issues at hand—the questions that will have to be solved before we can secure the desired goal of coöperation between labor and capital—before we can secure industrial peace.

It is particularly noticeable that industrial unrest has increased as the number of hours of labor has de-

creased. This is the problem of the leisure hour—probably one of the biggest sociological problems of the day. Eight hours for work, eight hours for sleep and eight hours to spend in some form not yet well defined. We call it recreation, recreation being the balancing influence of our lives. To be correctly applied, recreation must necessarily consist of those things that tend to develop the faculties that are not developed during the other 16 hours. In mining camps, particularly, there is not available sufficient recreation of the proper kind to make an adequate use of eight hours. What is the result? A man will probably spend three or four hours in the recreation provided and will spend the balance of the time wondering what to do or convincing himself that he is dissatisfied with conditions; probably the latter. It is no wonder, then, that agitators can use to their own profit a part of these eight hours and, talking to restless men, can easily stir up more unrest. The first problem for the mining camps, then, as I see it, is the proper and efficient use of the leisure hours.

It is also noticeable that with the increase in reforms, reform laws, etc., there has been an increase in unrest. Probably the most prominent reform in Arizona has been the abolishment of the saloon. It would be folly to say that this has been at all responsible for the unrest of today but it is nevertheless a factor to be considered not from the point of view of a saloon but from the point of view that its removal has taken something from the life of the men and has not replaced it. Prohibition has been a wonderful thing for Arizona. It has emptied her jails; it has multiplied her bank accounts and has emptied her poorhouses but, considered only from the point of removing the saloon, it has not been a complete success. A reform that takes off the top only, leaving the foundation standing, is not complete; the real problem is to remove the cause. Prohibition will undoubtedly eventually remove the cause, but not for a generation or two, and something must be provided now to replace the saloon.

No Satisfactory Substitute for Saloons

Considering the matter as it relates to unrest, it takes no stretch of the imagination to see that the saloon provided something for the occupation of the leisure hours. It provided a place where there were bright lights, where a man could sit around and chat with his friends, taking the occasional drink perhaps, and there is no doubt about it that after a man has taken a few drinks he is not in the mood to magnify his troubles. It is argued by some that the "movies" replace the saloon to some extent, but if one observes the attendance at the moving-picture theaters at the mining camps, he will observe how few miners are included. Few men who work underground in silence and in semi-darkness all day will select the same conditions for recreation hours. It is unnatural.

This criticism is not intended for a moment to discourage prohibition but it is intended to show that one of the great problems of the camps today is to make a study of what constitutes a satisfactory recreation for the miner and how to provide that recreation. It is also intended to show that when one removes something from the life of a man, there should be substituted an equivalent or something better.

Noticeable again is the fact that with the diversity of nationalities represented in a mining camp there has been an increase in unrest. This is perfectly natural, for with the increase in the number of nationalities there must come an increase in the number of recreational pursuits available for and appealing to the various classes represented. Many of these peoples are clannish; they do not care to mix with others, this characteristic serving to no other purpose than to increase the difficulties of the occupation of the other eight hours. Then, too, there has been for several years a growing feeling of suspicion of our Government—that it is for the rich—this suspicion having come largely from the foreigners in our mining camps who have come from governments of this nature.

Decline of Loyalty with Large Organizations

Probably the most important factor in industrial unrest has been the increase in the size of individual organizations. Many of us have to look back but a few years to recall the days of the old-style mining camp, which consisted of five or six, eight or ten mines, employing 100 to 200 men, practically all American labor, each mine with its men in close association with the "boss"; each with its baseball team or athletic club, rivaling the other teams of the district, and each man loyal to the organization for which he was working. In those days it was not such a long jump from the man at the bottom to the one at the top, but today, when thousands instead of hundreds are employed, an organization where the workman is even in indirect communication with the head is virtually impossible. The impossibility of the man at the head keeping in intimate association with the workmen is evident; the lack of this, however, is regarded by many of the workmen as snobbery, and it is certainly one of the factors that tends to develop disloyalty.

It is argued on many sides that extreme prosperity is at the base of our industrial unrest, but it is difficult to find any evidence of this. Unrest is as prevalent in districts that are not so prosperous as in the more highly paid camps. The problem seems to be sociological and educational—sociological in the sense of providing the proper social influences in the communities that have leisure hours, reforms, and large organizations, and educational in the sense of giving the workman a knowledge of how to use the things provided for him for recreational purposes. The problem is one of camp welfare, every camp being a distinct problem in itself. It is impossible to say whether or not music would provide recreational desires to the workmen of any one camp; whether there should be parks, clubs, or Y. M. C. A.s. Camp welfare is the problem, and this in itself, brings up its own individual problems.

Dislike of Patronage

Probably the most difficult of solution of these is whether these forms of recreation should be company owned and controlled, company owned and community controlled, or community owned and controlled. There are arguments for and against all of these methods. American workmen resent anything that savors of patronage, to such an extent that they will not use the things provided for them if there is a semblance of patronage connected with them. Foreign labor is

not so discerning, although it must be remembered that many of the immigrants to this country have come here to avoid this patronage. In most of our mining camps there are clubs, parks and organizations of many kinds that are company owned. This is undoubtedly the better way, for it is generally difficult in any community to obtain the same things community owned, and if it were left to the community, these improvements probably would not be there. It is with the best of intentions that one finds the heads of departments of mining companies on the boards of directors of local community affairs. They are doing it because they feel a desire to do something for the community and because they feel that their presence on these boards and their work will make these organizations more valuable to the community. There is no doubt about the truth of this. Yet the fact that must be considered is the light in which the workmen receive it. Do they regard it as patronage or do they take it in the spirit in which it is given?

Antagonism Toward Company Ownership

Perhaps one of the principal reasons for antagonism toward the company is when the workman has to rent a company house, buy at a company store, or eat at the company boarding house, play pool in the company club house, swim in the company swimming pool and finally be buried in a company coffin in the company cemetery. Although all of these things are provided by the company far better than they could ever be provided by the workmen, grouped or individually, and although it seems to be for the best interests of the community that they be company owned and controlled, it is not difficult to see the resentment. Many camps have company stores which far surpass those of towns many times their size, but it is often true that the company store is regarded as one of the methods of the company for getting its money back.

I have often wondered if the agitator, should he open his heart to those in charge of company affairs, could give them a solution of their problems. It seems doubtful. In the first place, he has not been talking their real problems, but rather has been stirring up hatred and antagonism in a group of workmen already imbued with it. Moreover, the agitator, preaching the same thing all of the time, becomes what Mark Twain has called a "chronic liar"—one who has told the same lie so many times that he has come to believe it himself. This is true not only of the agitators but also of the local leaders—their judgment has become warped and it is impossible to reason with them. The big problem of the mining camps today is the development of loyalty, in the sense of loyalty between friends. It is doubtful if this exists in most of our camps. It is doubtful if loyalty between an animate object, the workman, and an inanimate object, the corporation, can exist.

Community Interest and Loyalty

If one were to search for the loyal men of the strike districts, he would probably find them to be the business men of the community, the home owners, the engineers and office men and the bosses, all of whom have a distinct interest in the community. Loyalty, then, as we know it, might be defined as community interest.

The problem then seems to be the development of community interest—whether it be interest in a home, a good school system by which the miner desires his children to profit, membership in some club, athletic association or other organization. The object of interest is of no consequence. It may be financial, social or education investment but it is, nevertheless, a community interest and it is this interest that makes for loyalty. There is no doubt that at this particular time patriotism and love of country furnished the interest of many to be loyal, as did also the knowledge that the products of the mines were needed by the nation, and resentment against anti-Government and anti-draft agitation. This, however, in its broader sense, is community interest.

To summarize, it becomes the problem of the mining companies to educate the workman to lead a satisfied life, to have the satisfaction that comes from well-spent recreational hours and not from the size of the pay check. The solution of this problem lies in the development of loyalty or community interest for the accomplishment of which the community must be provided with those things in which the workman would become interested and of which he would be a part.

High Potash-Bearing Slates in Georgia

By S. W. McCallie
State Geologist of Georgia

A slate deposit has recently been discovered in Georgia by the State Geological Survey, which seems to be an excellent raw material for the extraction of potash. The deposit here referred to, occurs on the Louisville & Nashville R.R., near Whites Station, Bartow County, 10 miles north of Cartersville, where it forms a belt at least six miles long, a quarter of a mile or more wide, and fully 300 ft. thick.

The remarkable feature of this slate is its high potash content. A large number of samples taken from different points along the outcropping, show more than 9% potash, which is from two to four times the amount found in common slate. Mr. Shearer, assistant state geologist, who has recently made a microscopic study of this slate, finds that it is made up almost entirely of sericite and feldspar, two of our most common potash-bearing minerals. The slate is of a light gray color, comparatively free from iron, has an excellent cleavage, and otherwise possesses all of the qualities of a first-class roofing slate.

The unusually high potash content of this slate, together with the proximity to transportation, uniformity of composition, and extent of the deposit, seems to offer favorable conditions for the extraction of potash.

The chemical composition of this slate is shown by the following analysis made in the laboratory of the State Geological Survey of a sample of slate from the Yancey property:

Silica, 54.68%; alumina, 20.14; ferric oxide, 3.28; ferrous oxide, 3.17; magnesia, 3.09; lime, nil; soda, 1.08; potash, 9.39; ignition, 3.51; moisture, 0.14; carbon dioxide, nil; titanium dioxide, 1.01; phosphorus pentoxide, nil; sulphur trioxide, nil; sulphur, 0.10; manganous oxide, nil; barium oxide, nil; total, 99.57 per cent.

Sulphur Deposits of Western Texas*

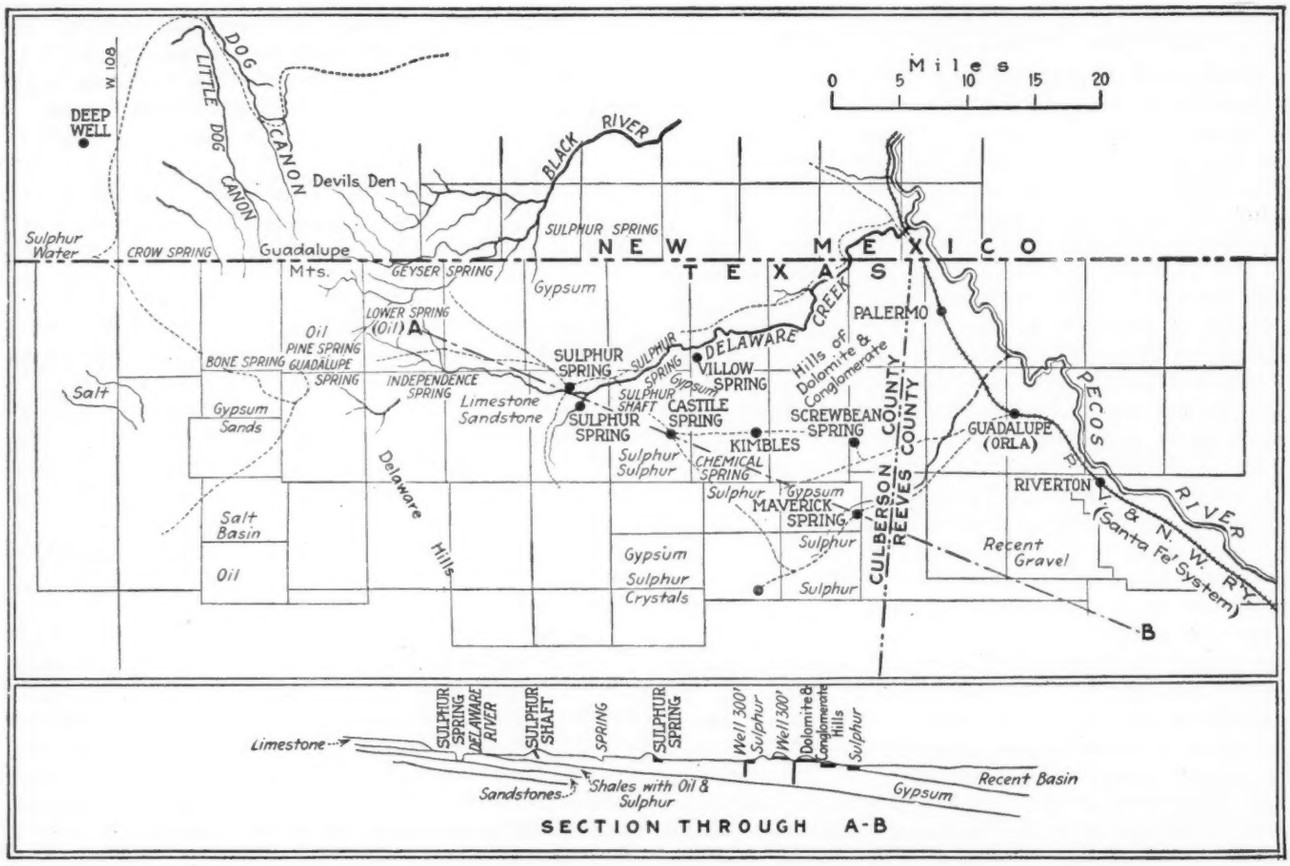
Existence of sulphur in western Texas has been long known, though deposits were first mined about 20 years ago. Principal developments now about 15 to 20 miles from railroad. Climate is arid and fuel scarce. Average content of workable material estimated as 30% sulphur.

THE existence of sulphur in western Texas was noted by William P. Blake in reporting the geology of one division of the 1853-1854 Government survey for a railroad route to the Pacific Ocean. Various accounts have since been published regarding different sulphur deposits in that locality. The mention of El Paso County in early references is explained by the fact that not until 1913 was the eastern portion of the old El Paso County organized into Culberson County.

The principal sulphur districts are in Culberson County, from 35 to 40 miles north of the town of Toyah, and a little farther from Pecos, the county seat of Reeves County. The principal development has been in the Maverick Springs district, from 15 to 20 mi. west of the Santa Fe lines at Orla, Reeves County, 40 mi. north of Pecos.

The first mining work on any of these deposits was done about 20 years ago on the Cooksey property in Sections 10 and 15, Block 114. A Mr. Choteau of St. Louis, Mo., installed a vertical extractor using steam, and it is said that two carloads of sulphur were shipped to St. Louis. Most of the recent prospecting and development work has been in the Maverick Springs district, about 15 mi. southeast of the Cooksey property. On the old Kyle property, within a mile of the springs, was a sort of extractor and the building of a *calcarone* was attemped. The Dot property is 3 mi. to the southwest of the old Kyle. The West Texas Sulphur Co. controls the old Kyle, and the Toyah Valley Sulphur Co. owns land near that property and also near the Dot property. The holdings of the United States Sulphur Co. and of the Michigan Sulphur and Oil Co. are toward the head of Virginia Draw, about 5 mi. southwest of the springs. Prospecting and development work have been undertaken on the properties of the above-named companies and of the Sun Sulphur Co., all within an area 5 mi. southwest of Maverick Springs. The American Sulphur Co. has produced a little sulphur from a property near Rustler Springs.

The other principal localities in Culberson county where discoveries have been made and prospecting done are: Block 42, Sections 7, 8 and 9, the Pat, Lone Wolf and Golson claims; Block 60, Sections 15 and 16; Block 61, Sections 8, 16, 17 and 18, Grant mines, etc.; Block



MAP AND SECTION SHOWING SITUATION AND OUTLINE GEOLOGY OF THE SULPHUR DEPOSITS OF CULBERSON COUNTY, TEXAS

*Abstract of a paper entitled "The Sulphur Deposits in Culberson County, Texas," by William B. Phillips, to be read at the St. Louis meeting of the American Institute of Mining Engineers, Oct. 8-13, 1917.

109, Sections 4, 5, 9, 10 and 24, Nelson claims, etc.; Block 113, Section 14, the Hicks claims; Block 114, Sections 10 and 15, the Cooksey property; Block 115, Sections 10, 11, 18, 19, 22 and 23. In Reeves County, sulphur occurs in Block 59, Section 17 or 9, near the old Huling-Ross oil wells and within a short distance of the oil well bored to a depth of 4100 ft. by The Texas Co.

The Guadalupe Mountains, 45 mi. northwest of Maverick Springs, form the chief topographic feature of the region; El Capitan, with an elevation of 8690 ft., being the highest point in the state. The Rustler Hills, 30 mi. to the southeast, are much lower. From these to the Pecos river the slope is gradual but constant. The Guadalupe Mountains are regarded as Carboniferous, though some geologists consider them as Permian. The Rustler Hills have been classed with the Castile gypsum, questionably Permian series of the Carboniferous. Overlying these beds of gypsum, from the vicinity of Maverick Springs to the eastward, are the deposits classed as Quaternary or Cretaceous and the Recent and Pleistocene. They are characterized by gypsum, outcrops of "Red Beds" and remains of dolomite hills. In places the "Red Beds" cover considerable areas, as in Sections 13, 14 and 24, Block 113, and in Section 1, Block 111. At a point a little to the northeast of the latter, core drilling in an outcrop of "Red Beds" showed red sandstone to 47.5 ft. and then 2.5 ft. of massive white gypsum in which were scattered crystals of sulphur. Two wells, bored by The Texas Petroleum Co. in 1914 and 1915, near the south line of Survey 24, Block 110, gave opportunity for a more extended study of the underlying rocks. No deposits of sulphur were found, but the deeper well was bored to a depth of 2265 ft. and at 2018 to 2020 ft. several barrels of oil were reported. A detailed account of the log of this well is given, from 85 to 2236 ft. Varying amounts of pyrite were noted at intervals from 150 ft. to 2138 ft., usually with limestone or dolomite and frequently in exceedingly fine particles, impregnating anhydrite. Wherever elemental sulphur was noted, it appears to have been accompanied by anhydrite.

Climate, Water Supply and Fuel

The climate of this part of Texas is arid, the mean annual rainfall being 8 to 10 inches. For long intervals there is no rain, and what little snow or sleet falls during the winter does not remain on the ground.

Shallow wells in the region usually yield plenty of water, highly impregnated with mineral matter. A table of 12 analyses of water from different sources shows a range of total solids from 183.627 to 1831.202 (presumably grains per U. S. gallon), the maximum carrying 1309.011 parts of NaCl, or common salt. In many places the water carries much H_2S, or sulphureted hydrogen gas, when issuing from the ground. Running water is comparatively free from the gas, as it escapes or is oxidized with a consequent deposition of sulphur. One sample of water contained 79.08 grains of free sulphuric acid per gallon. It is expected that, if any considerable development work is undertaken in the district, a large quantity of water from the best sources may be impounded by constructing earth dams.

The local fuel is juniper, or mountain (scrub) cedar, hauled from points 5 to 10 miles distant. It makes a quick and hot fire but has no lasting qualities, and the supply is sufficient only for ordinary household use. Twenty miles southeast of the Maverick Springs district, Section 16, Block 59, Reeves County, are shallow oil wells on the Huling-White-Ross ranch that have been known for some time. The oil comes from a depth of about 230 ft. and is an excellent lubricant but has thus far been used only for lubricating windmills and so forth. Fuel for industrial purposes would probably have to be hauled in some manner from Orla, where best screened Texas lump coal can be laid down for $5.15 per ton. There has also been some talk about the possibilities of natural gas as a fuel for the district.

Origin of the Sulphur Deposits Not Yet Definitely Determined

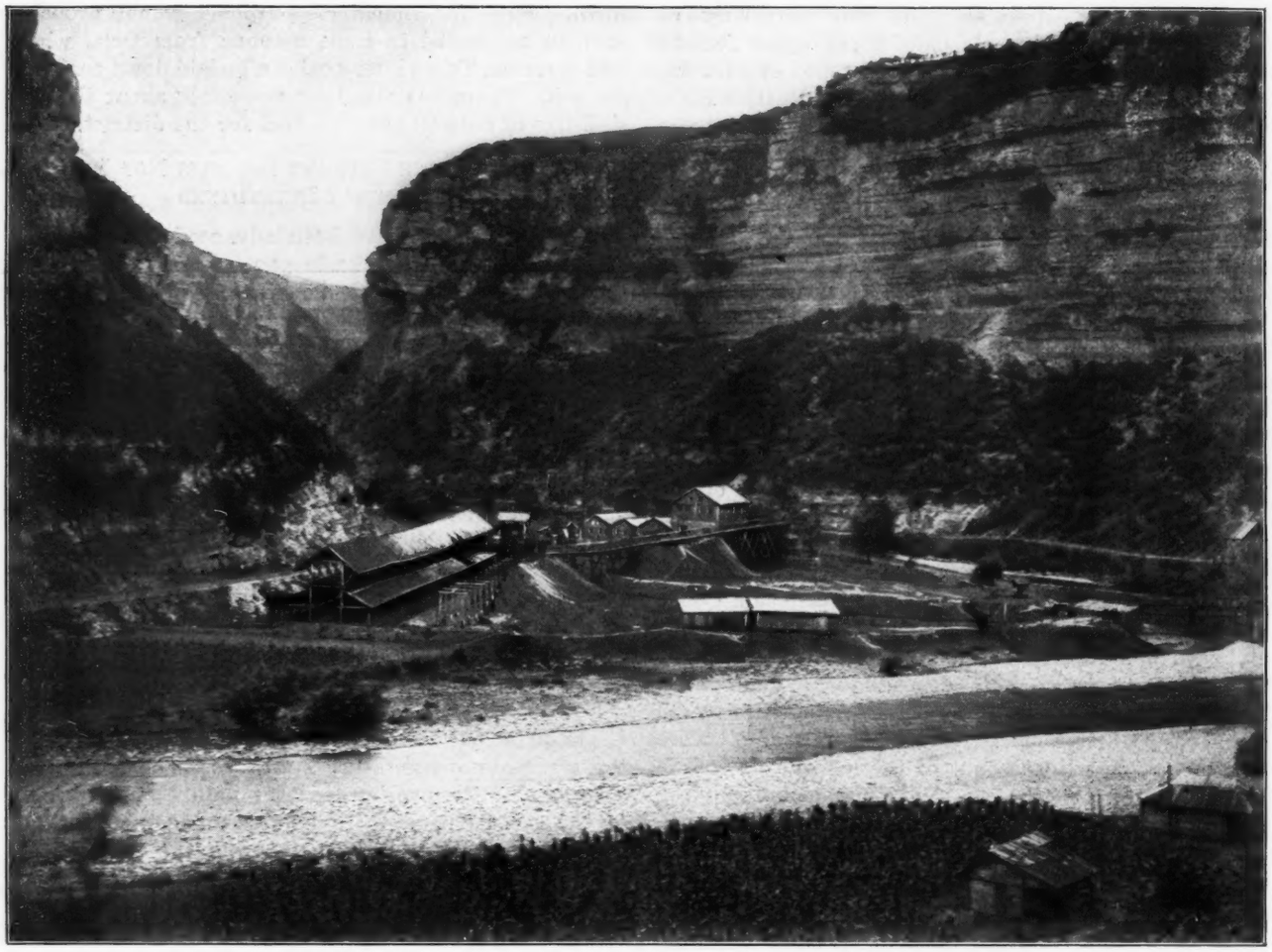
Various theories have been advanced regarding the origin of sulphur deposits in general and it is believed that the deposits in Culberson County may have arisen in one or more of the following ways: (1) Through the action of hydrogen sulphide on limestone or dolomite; (2) through the decomposition of waters carrying alkaline sulphides; (3) through the decomposition of gypsum impregnated with bituminous substances; (4) through the precipitation of sulphur from sulphur bearing gases, especially sulphureted hydrogen. It is deemed improbable that volcanic or seismic agencies are responsible for the deposition of the sulphur, though it is conceded that they may have caused dislocations of the strata and thus provided for the circulation of sulphur-bearing waters and gases.

Some Properties Seem Worthy of Systematic Prospecting

The principal factors entering into the utilization of these sulphur deposits are stated as: The nature and thickness of the overburden; the nature and thickness of the several bands of sulphur-bearing material that are within workable distances from the surface; the methods of extraction; the transportation of the product to available markets; and the sale of the product, inclusive of the capital required for carrying stocks of the product. The development work has not been sufficient to arrive at a general conclusion. The estimates of millions of tons of workable material have not been confirmed by regular sampling and analysis. Many statements that have been made were founded on a basis of hope.

The advantages of the district are that it is 700 miles nearer the western points of actual and possible consumption than the deposits at the mouth of the Brazos River in Texas, and that the initial investment would be comparatively small with respect both to prospecting and development. The operations have been conducted on so small a scale that no reliable data can be given on the cost of production or the quality of material obtainable. However, some of the sulphur properties at and near Maverick Springs and toward the upper part of Virginia Draw seem to be worthy of systematic prospecting. There is a considerable amount of sulphur within 50 ft. of the surface and it can be mined cheaply. The average content of native sulphur in the material is estimated as about 30%; but it is not known today how much of the area involved will yield material of this class, nor what is the average thickness of the overburden that will have to be removed.

Views from Tchiatouri, Caucasus, Russia



WASHING PLANT IN THE TCHIATOURI MANGANESE DISTRICT, RUSSIA

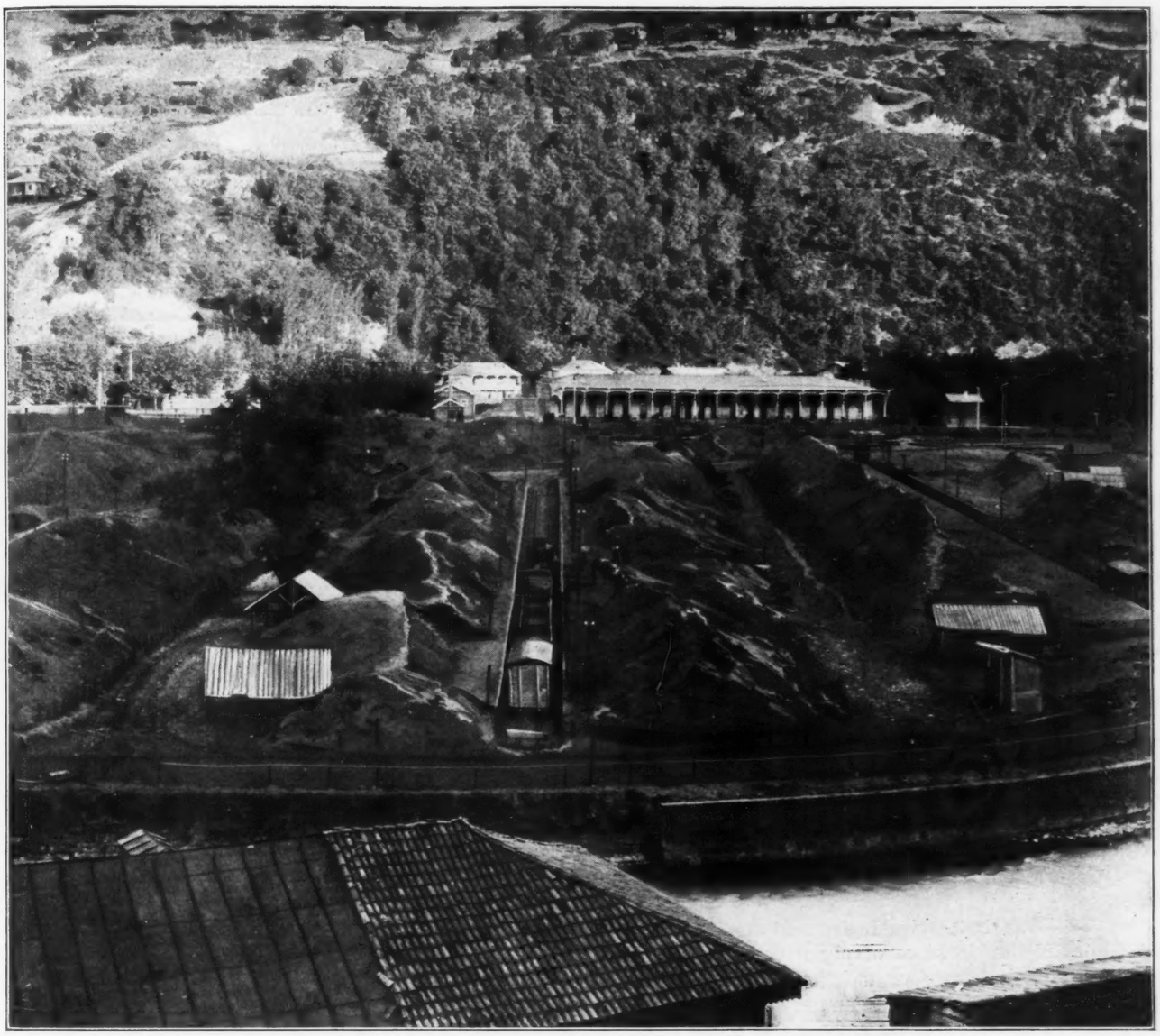
The Kriville River and its tributaries have cut deeply into the sandstones of the Tchiatouri (sometimes spelled Chiatouri) district exposing extensive bedded deposit of manganese ore on and near the tops of the hills, 500 to 600 ft. above the river

TOWN OF TCHIATOURI, CAUCASUS, RUSSIA

The outcrop of manganese can be traced near the summit of the cliffs in the background. The deposit is interbedded in the sandstone strata and has an average dip of only about 3°. In places the capping is only a few feet thick and nowhere is the thickness great

GRAVITY TRAM FROM MINES TO WASHERY

The manganese ore is mined in seams of an average stoping thickness of 7 to 8 ft. The ore is soft pyrolusite, easily broken from place by pick and contains 40% Mn. It is hand sorted at this mine and transported to the river by gravity tram

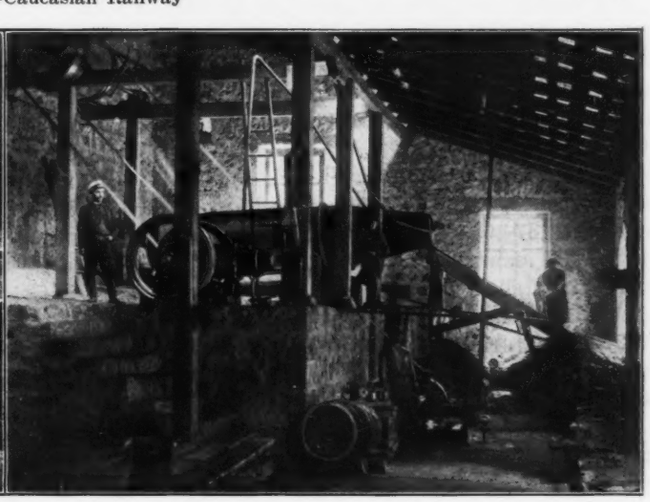


TCHIATOURI RAILWAY STATION AND MANGANESE STOCKPILES

After washing the concentrates are stockpiled close to the railroad. Stockpiles of concentrates are accumulated by the various producers who cannot obtain railway cars until they can show a certain tonnage ready for shipment. Tchiatouri is reached by a 25-mile narrow-gage road from the main line of the Trans-Caucasian Railway

TYPICAL WASHING PLANT IN THE CAUCASUS

The Tchiatouri district produced in 1913 over 1,000,000 tons of manganese concentrates, or nearly half the world's output. The output could be greatly expanded, in normal times, but the lands are owned by peasants and small groups of individuals making organization on a large scale difficult



INTERIOR OF A TCHIATOURI WASHING PLANT

The ore requires little or no crushing. Treatment is simple, consisting merely of screening out the siliceous gangue, followed by rough water concentration on tables or jigs. The concentrate runs from 55 to 60% manganese and about 0.15% phosphorus

Chronology of Mining for September

Sept. 5—Minerals Separation won its suit in U. S. District Court in Montana for infringement of flotation patents by Butte & Superior, which continues to operate under special agreement.

Sept. 5—I. W. W. headquarters throughout the United States were raided on orders from Attorney General Gregory.

Sept. 8—Decree granted by U. S. District Court of Delaware in favor of Minerals Separation company in the flotation suit against the Miami Copper Co., which is continuing to operate under bond—Mexican House of Congress passes bill providing for the temporary taking over and management by the Government of industries not being operated.

Sept. 10—Embargo on exportation of gold proclaimed by President Wilson.

Sept. 13—Shasta County, Calif., copper miners and smeltermen returned to work.

Sept. 17—Resumption of operations in mines and smelteries of the Anaconda Copper Mining Co. in Montana.

Sept. 20—American Federation of Labor requests President Wilson to appoint committee to investigate Arizona labor conditions.

Sept. 20—Price of silver advanced to $1.08½ per ounce.

Sept. 21—Copper price of 23½c. per lb. f.o.b. New York to Government, Allies and the public, was fixed by voluntary agreement between the Government and leading copper producers, effective for four months, producers agreeing not to reduce wages and to maintain maximum output—Potash bill passed providing for leasing of Government's potash lands to citizens of United States.

Sept. 24—War Industries Board and steel producers agree to reduction in price of pig iron, steel products and coke, effective for four months, $33 for pig iron and $6 for coke.

Sept. 28—Carranza decrees embargo, effective Oct. 1, on exports of gold and silver.

Mineral Production of New York

Statistics of mineral production in 1916, compiled by the State Geologist's office in coöperation with the U. S. Geological Survey, show the following items, arranged in the order of descending value: Portland cement, 5,603,477 bbl.; iron ore, 1,464,917 long tons; salt, 14,087,750 bbl.; sand and gravel, including molding sand, 8,098,097 short tons; natural gas, 8,594,187,000 cu.ft.; petroleum, 874,097 bbl.; gypsum, 579,827 short tons; talc, 93,236 short tons; mineral waters, 7,746,490 gal.; garnet, 5840 short tons; emery, 15,282 short tons; feldspar and quartz, 20,379 short tons; sand-lime brick, 15,851 M; natural cement, 104,415 bbl.; crude clay, 11,158 short tons; metallic paint (iron ore sold for paint manufacture), 14,572 short tons; slate, 2727 squares.

In addition to the above items zinc ore, apatite, diatomaceous earth, marl, mica, pyrite and graphite were produced, the quantities of which are not given separately, but their value was $2,011,666. Also, the following products are reported by value instead of by quantity: Granite, $368,119; limestone, $3,672,454; marble, $268,391; sandstone and trap, $1,670,658. The total value of the mineral products was $45,654,770, which represented an increase of approximately $10,000,000 over the figure for 1915.

Report of Copper Production

This table is compiled from reports received from the respective companies (except in the cases noted by asterisk as estimated), together with the reports of the United States Department of Commerce as to imported material, and in the main represents the crude-copper content of blister copper, in pounds.

	May	June	July	Aug.
Alaska shipments	7,146,824	7,714,928	8,116,538	3,891,621
Arizona:				
Arizona Copper	5,200,000	4,800,000	nil	nil
Cons. Ariz. Smelting	1,650,000	1,600,000	1,550,000	1,450,000
Inspiration	11,900,000	11,150,000	nil	nil
Miami	5,112,000	5,349,000	nil	260,000
Old Dominion	4,430,000	3,965,000	nil	875,000
Ray	8,815,281	7,614,114	7,808,766	7,749,509
Shannon	964,000	956,000	nil	nil
Other Arizona	25,954,310	24,232,675	20,032,410	22,829,806
California:				
Mammoth	2,000,000	1,800,000	1,750,000	1,725,000
Michigan:				
Calumet & Hecla	14,450,011	13,347,525	11,933,433	12,338,735
Other Lake Superior *	8,500,000	8,000,000	8,000,000	8,000,000
Montana:				
Anaconda	28,400,000	20,400,000	12,400,000	11,175,000
East Butte	2,008,060	1,519,240	nil	1,676,360
Nevada:				
Mason Valley	1,528,813	1,465,000	1,316,725	1,417,717
Nevada Cons	7,239,978	6,850,186	7,253,337	6,439,984
New Mexico:				
Chino	6,984,457	7,193,262	7,343,757	6,824,127
Utah:				
Utah Copper	19,262,856	19,909,097	18,127,154	18,796,012
Eastern smelters *	2,521,800	2,200,000	2,000,000	2,000,000
Total reported	163,068,390	150,066,027	107,632,120	107,448,871
Others, estimated	24,682,420	22,182,000	20,000,000	20,000,000
Total United States	187,750,810	172,248,027	127,632,120	127,448,871
Imports, ore and concentrates	16,820,020	15,607,586	9,484,116	.....
Imports in blister, etc	32,026,855	45,100,414	10,179,095	.....
Grand total	236,597,685	232,956,027	147,295,331	.....
British Columbia:				
Canada Copper Corpn	270,816	178,976	nil	212,772
Granby Cons	3,159,284	3,030,929	3,147,886	3,836,770
Mexico:				
Boleo	1,929,088	1,740,500	1,411,290	1,433,040
Cananea	4,370,000	3,210,000	nil	nil
Other Foreign:				
Braden	6,750,000	5,002,000	6,015,000	4,512,000
Cerro de Pasco	4,670,000	5,032,000	6,262,000	6,036,000
Chile	8,250,000	6,114,000	6,250,000	8,036,000
Cape Copper	396,825	359,350	363,759	178,573
Kyshtim	1,176,000	*1,379,000	752,640	.....
Katanga	5,643,775	5,246,950	4,850,120	5,445,360

* Estimated.

The grand total, which in the case of May was 236,597,685 lb., includes, under "Imports in ore and blister copper" the production of such companies as Canada Copper, Granby, Cananea, Braden, Cerro de Pasco and Chile. As a matter of record, however, the individual figures are given after the total. We also report the production of the Boleo, Cape Copper, Kyshtim and Katanga companies, whose copper does not come here.

The item "Alaska shipments" gives the official figure of the United States Department of Commerce. Kennecott production May to August was 7,208,000; 5,848,000; 3,580,000; and 7,048,000 lb., respectively.

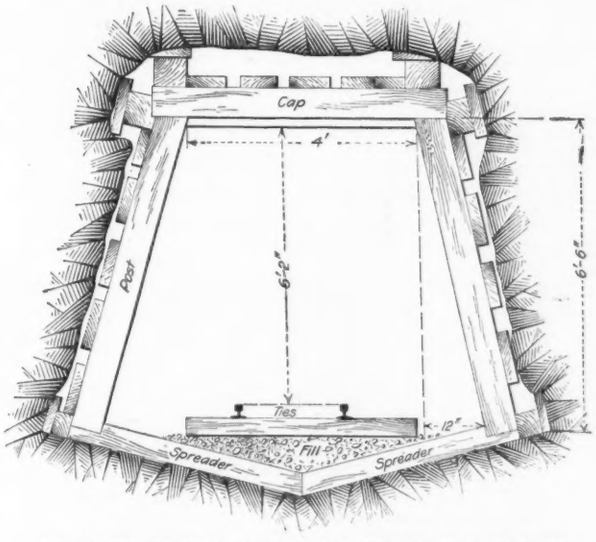
The total production of the United States for the first eight months of 1917 was as follows:

January	174,658,603
February	183,859,588
March	192,211,648
April	188,685,898
May	187,750,810
June	172,248,027
July	127,632,120
August	127,448,871
Total	1,354,495,565

Details of Practical Mining

Spreader for Drift Set in Swelling Ground

The practice of standing drift timber sets on sills in swelling ground has been to a large extent discontinued on account of the effect of bowing that is difficult to repair. In many cases the posts are simply stood on foot blocks but where side pressure, as well as swelling from below, occurs, spreaders, such as are shown in the drawing, have proved effective. They are in two pieces, each framed with a tenon on one end to catch the post, as shown in drawing, and with a bevel where they meet at



A DRIFT-POST SPREADER FOR SWELLING GROUND

the center of the drift. Any pressure from below would tend to raise them and push the bottom of the posts outward against the blocks; likewise any pressure from the sides would tend to force them downward against the solid bottom and an equilibrium is maintained until the timbers either fail or are relieved. Such spreaders have the advantage of being conveniently replaced under a track without interfering with tramming.

A Hint on Grading a Sidehill Road

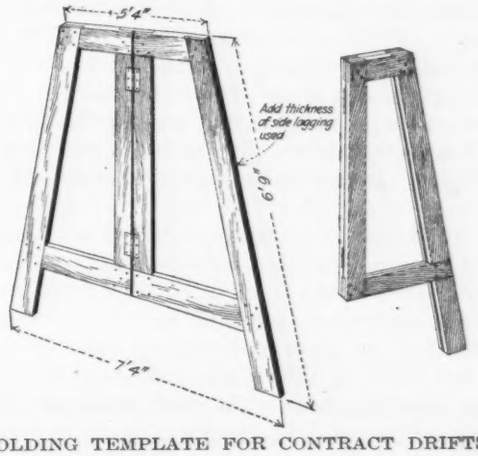
There are relatively few road builders who know how to grade a road on a steep sidehill in the most economical manner. According to *Engineering and Contracting*, Sept. 5, 1917, if the hill is so steep that a team of horses cannot travel along it, one ordinarily sees a gang of pick and shovel men excavating the roadway, and not infrequently the men carry the excavation to grade without the assistance of horses or machinery. A road builder experienced in mountain work may first attack a steep sidehill by handwork, but he does so only to build a narrow path along which a single horse can walk. Thereafter there is no more picking and shoveling.

A pioneer path, as it may be called, is first graded by hand on the sidehill along the upper slope stakes. Then a one-horse, sidehill plow starts plowing and widening the path to about 3 ft. by casting the earth down hill. The next step is to use a light single-horse V. The V should be shod and have a sharp cutting edge at the front, and should be so attached to the singletree as to tend to crowd into the side of the hill. After grading a width of about 5 ft. a two-horse plow can be used, followed by a two-horse V to shove the earth down hill. The next step is to use a light road grader drawn by two to four horses. The foregoing applies to roadways up to, say, 12 ft. wide. If the road is wider and fairly long a steam shovel or a power scraper is usually more economical than team work.

Template for Measuring Drift

BY C. A. HUTCHINSON

Whenever a drift or crosscut is driven on contract, there is likely to be an argument on "measuring-up" day as to where the end of the tape should be held at the breast in order to give full distance for the work done and yet not pay for more. In Mexico the miners have to be watched in order to make them keep the drift bottoms down to grade and the backs high enough and, in fact, to deter them from "finishing" a drift by "running it up to a point." Each time a measurement



FOLDING TEMPLATE FOR CONTRACT DRIFTS

is made for *cuele* there is an argument, so the "cuele board" or template was constructed.

The cuele board is a folding, wooden frame made according to the contracted size of a drift. If, for example, the drift is to be 4 x 6 ft. in the clear, 8-in. timbers to be placed in sets each 4 ft. between the posts at the cap with a 12-in. batter to the posts, the template would correspond in size to the outside dimensions shown in the accompanying sketch, plus the thickness of lagging used. If no timber is to be used, the template would be made to approximate the proper drift dimensions and shape.

The center of this template, when stood in a vertical position at the farthest point ahead in a drift to which it can be made to pass continuously in this position, is the *cuele* or distance upon which payment is to be made. A "bump" in the back or wall may stop the passage of the template 10 ft. back from the breast, but *"quien tiene la culpa"?* That's the distance the contractor has completed ready for payment.

Mounting Blueprints on Muslin

Maps and plans on paper frequently fail by tearing or wearing due to hard usage. Sensitized cloth has been employed more or less successfully, but it has its disadvantages due to the fact that the cloth is generally of poor quality and tears easily. Furthermore, if allowed to stand for some time before being used, the sensitizing solution causes the cloth to rot. A much better and not too difficult method is to mount the paper print upon cloth, says Milton Harris in *Engineering News-Record*, Sept. 27. Large wall maps hang better and are much less liable to be harmed when mounted in this way than when left unmounted.

The print should be made upon "medium" weight paper unless an extra strong sheet is desired. While the printing is going on, a helper can prepare the cloth backing. Unbleached muslin that sells at about 10c. per yd. is ordinarily used. Select a smooth board, larger than the size of the print to be mounted, and clean it thoroughly. A drafting board or the top of a drafting table is excellent for this purpose—provided it is not cedar, for cedar will stain the prints. Fasten the cloth on this board with 4-oz. carpet tacks spaced about 2 in. apart,, and driven only partially home, so as to be easily pulled. Tack one edge of the cloth down, stretching is smooth but not too tightly, for the paper contracts on dryingout and will crack if there is not enough "give" to the cloth. Follow around the edge of the cloth until it is completely tacked down. It should now present a smooth surface and is ready for the mount. If many prints are to be mounted it may be an advantage to set several boards, end to end, and tack the cloth over their entire length. In this manner considerable cloth can be saved.

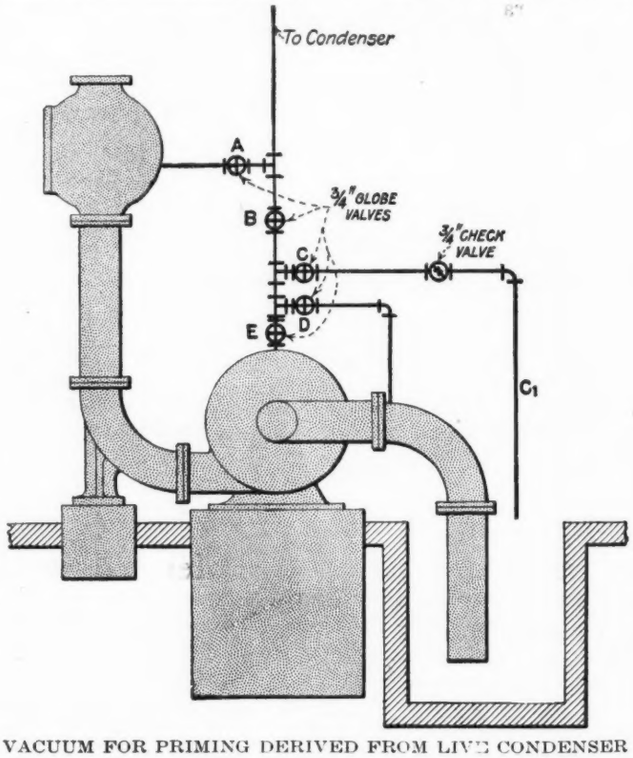
After washing the prints they should be taken from the final bath and the excess water blotted from both sides with a dry towel or cloth. If the print has been made some time previously and is dry, immerse it in water for two or three minutes—or until it is thoroughly wet—then remove it and proceed as above. Lay the print carefully down on a clean table top or board and apply a thin but even coating of paste, making sure that the edges and corners have received their share. The paste should be a fresh, stiff corn-starch paste or fresh wall-paper paste. "Kodak adhesive," a trade compound, has been found to be an excellent paste when made according to directions. Glue or library paste is unsatisfactory and should not be used.

Pick the paper up carefully and while one man holds an edge above the cloth, the other, on the opposite side of the table, should take the lowered edge and paste it down—using a stiff kalsomine or large, flat paint brush. Brush the paper down, working away from the body with short strokes, the helper slowly lowering his end. In this manner the brush will drive out all air bubbles and make a uniformly smooth job. After the paper is brushed fast, take a stiff clothes brush and gently pat the edges down, thus insuring a perfect contact at the vulnerable point.

The print should dry slowly in an even, moderate temperature for at least 36 hours. The print can then be trimmed. If a Van Dyke print, corrections, if any, should be applied at this time, using ordinary black drawing ink. A job completed for the county assessor's office at Benton County, Ore., cost 0.073c. per sq.ft. The prints were Van Dykes made from Van Dyke negatives which were several years old. Each print was about 36 x 36 inches.

Priming a Centrifugal Pump

A 13,500-gal. centrifugal pump was difficult to prime and lost its suction frequently. It was used to lift water to a tank for supplying the jet condensers, and it was essential that the supply be constant. How the difficulties were overcome by a system of piping is shown in the illustration contributed by E. S. Ray in *Power*, Oct. 2,



VACUUM FOR PRIMING DERIVED FROM LIVE CONDENSER

1917. The pipe so marked was connected to the condenser, which was always working before this pump was required. Before starting, all the valves were opened for a short time to exhaust the air, but when the pump was working up to speed valves *A* and *D* were closed and *B* left about one-quarter turn open and *C* and *E* left wide open. With the pump working properly, water discharged from pipe C_1, but if it failed no water discharged from this pipe, so it acted as a telltale. The check valve prevented any back flow of air into the pump or piping.

In Relining Timber Sets "longitudinal" caps may be used effectively. Placed parallel to the drift under the old sets and supported by posts every 6 or 8 ft., a better distribution of the weight is obtained.

Events and Economics of the War

The adjournment of Congress on Oct. 6 was preceded by a dramatic debate on the question of expelling Senator La Follette for disloyalty; his conduct is to be investigated by a special committee; the soldiers' and sailors' civil rights bill passed the House. The embargo against neutrals has been tightened and no coal will be allowed those suspected of supplying Germany. Hoover is to be aided by the Secret Service in enforcing the provisions of the Food bill. The navy has opened the most powerful radio station in the world in Hawaii; an American destroyer accidentally fired on an Italian submarine. Jesus Martinez, the Mexican vice-consul at New York, was arrested for refusing to comply with the requirements of the draft law.

England has prohibited exports to northern neutrals; the cruiser "Drake" was torpedoed off the Irish coast; further important gains were made by Haig near Ypres on the Passchendaele-Gheluvelt Ridge. In France, Malvy, the minister of the interior, has been accused of being a German spy; Bolo Pasha has been charged with attempting to bring about a separate peace through corrupting the press. Kerensky has formed a coalition cabinet in defiance of the Russian Congress who wish certain elements ignored. The Kaiser has been warned by Pope Benedict against an extension of air raiding; a German wireless station has been opened in Willemstad, Curaçao, and now handles the oversea service from Nauen, Germany. Uruguay and Peru have broken with Germany and Guatemala has evicted German editors.

Recommendation of War Convention of Business Men

The recent War Convention of business men held at Atlantic City, N. J., went on record in favor of payment of war taxes in quarterly instalments and in favor of giving opportunity to producers to present the facts of production costs in the process of Federal price fixing. It advocated the adoption, by Congress, of the proposed legislation authorizing the suspension of the Federal shipping laws so that foreign vessels may be admitted to our coastwise trade, thus releasing American vessels for transport service; it strongly urged the immediate construction of more ships; it condemned profiteering; it proposed the creation of a Federal arbitration board to settle industrial disputes during the war; it extended sympathy and support to Russia.

A resolution to maintain existing industrial conditions, as advocated by the Secretary of Labor, was indorsed; the convention reiterated the National Chamber's conviction that universal military training is essential to the future safety and success of the nation; it urged coöperation for the naturalization of resident aliens; it advocated the creation of committees to represent each trade and industry in dealing with the Federal authorities. Extension of the Federal employment service in the Department of Labor was recommended, as was also the adoption of the summer "daylight-saving" plan. It was urged that the Government take such steps as may be necessary to maintain the parity of the American dollar.

Passage by Congress of the Webb bill was asked to permit Americans to coöperate for export trade. Greater economy in the retail distribution of commodities was advocated; highway improvement as a war measure was recommended, and the creation of a commission to study conditions abroad was suggested. The convention urged the calling of war meetings of organizations which are members of the United States Chamber of Commerce and expressed the hope that the International Congress of Chambers of Commerce might be held in the near future.

World Embargo Against Germany

Exportation of all articles to Sweden, Norway, Denmark and Netherlands has been absolutely prohibited by Great Britain. The only thing excepted is printed matter, this doubtless to insure that Germany may keep posted on what the rest of the world thinks of her. This British step, following the similar action taken by this country upon July 15 last, is looked upon as the opening of an Anglo-American campaign to guarantee the complete stoppage of Germany's supplies. It is still possible that some goods will reach the northern neutrals from South America. To guard against this, the Exports Administrative Board announces that not only will bunker coal be refused to vessels bound for European neutral ports with cargoes of goods which might find their way to Germany, but vessels bound for South American ports will likewise be refused coal if the commander does not agree on his return to have on board a cargo which may be approved by the board, or which is destined for a country other than one of the border neutrals.

Embargo List Revised

The Exports Administrative Board has announced that brass, bronze and caustic soda have been added to the list of commodities requiring licenses before being exported to any country of the world. It has further published a list of over 600 articles which it has decided do not require an export license under the President's proclamation of Aug. 27, 1917, except when shipped to Germany, her allies or neutral countries of Europe. Included in this list are the following:

Acetic acid, acetic anhydrine, acetate of lead, acetate of cobalt, acetate of lime, acetate of soda, acid (tartaric or hydrofluoric), air compressor and parts, aluminum paint, ammonia condensers, ammonia valves and pipe fittings, amorphous phosphorus, antimony (black), asphalt, arsenic, asbestos, asbestos paper and pulp, balata sheets, bauxite ore, bismuth subgallic, bichromate of soda, borax, boric

acid, bromide (soda), calcium carbide, calcium chloride, chrome alum, copper paint, creosote, dredging buckets (iron), elevator machinery and repair parts, fire clay, german silver, gilsonite, glacial acetic acid, glauber salts, gold enamel, hydrogen peroxide, hydrated lime, hyposulphite of soda, iodine, iron bands, bars and castings, iron pipe and pipe fittings, iron hose fittings, iron plates or sheets under ⅛ in. thick, iron rivets, valves and wire, jacks, magnesia, machinery (concrete), metal valves, oxalic acid, oxide-of-iron paint, phenolphthalein, phosphorus, phosphate (sodium), pipe (galvanized), precision tools (hand), pyrometers, rails (steel), railroad cars, railroad picks, rubber, rubber cement, salammoniac, saw blades, silicate of soda, silex, silverware, soapstone slabs, soda ash, sodium fluoride, steam traps, steam locomotives, stocks and dies, steel hoists, steel plates or sheets under ⅛ in. thick, strontium bromide and carbonate, taps and dies (hand), yellow phosphorus, zinc white in oil, zinc oxide.

No licenses whatever will be granted to sailing vessels passing through the war zone even though the goods themselves may already have been licensed.

State Fuel Administrators Appointed

The following appointments of state fuel administrators are announced by Dr. Garfield:

S. P. Kennedy, Anniston, Ala.; Thomas W. Russell, Hartford, Conn.; Dr. L. G. Hardman, Commerce, Ga.; Charles W. Webster, Waucoma, Iowa; Emerson T. Carey, Hutchinson, Kan.; J. H. Hamlen, Portland, Me.; James J. Storrow, Boston, Mass.; M. J. Swindlehurst, Helena, Mont.; Charles M. Floyd, Manchester, N. H.; A. W. McAllister, Greensboro, N. C.; Harry R. Conn, Van Wert, Ohio; P. A. Norris, Ada, Okla.; George H. Holmes, Providence, R. I.; W. W. Armstrong, Salt Lake City, Utah; H. J. M. Jones, Montpelier, Vt.; W. N. Fitzgerald, Milwaukee, Wis.; E. H. Walker, Carson City, Nev., David Whitcomb, Seattle, Wash.; and Frank R. Gooding, Gooding, Idaho. The New England States will be under the general direction of James J. Storrow, who, with the several state representatives, will constitute the New England fuel committee.

Retail Coal Profits Defined

The recent order of the Fuel Administrator, Dr. Harry A. Garfield, defining the profits of retail coal and coke dealers throughout the country, is expected to effect an immediate decrease in the prices now charged the consumer. The text of the order follows:

On and after the first day of October, 1917, in making prices and sales to consumers, the retail gross margin (as hereinafter defined) added by any retail dealer to the average cost (determined as hereinafter provided) of any size or grade of coal or coke for each class of business shall not exceed the average gross margin added by such dealer for the same size or grade for each class of business during the calendar year 1915, plus 30% of retail gross margin for the calendar year 1915; provided, however, that the retail gross margin added by any retail dealer shall in no case exceed the average added by such dealer for the same size, grade and class of business during July, 1917. By this order retailers are required to fix a retail gross margin which may be less than but shall not in any instance exceed the margin added by them in 1915, plus 30% thereof.

The retail margin is the difference between the price charged by a retail coal or coke dealer to consumers and the average cost of coal or coke to such retailer, free on board railroad cars at his railroad siding, yard, pocket or trestle, when such coal or coke is received by him by rail.

A similar provision is made when the coal or coke is received by water. The order provides that the average cost of coal or coke to retail dealers shall be ascertained by them for each size and grade on the first and sixteenth days of each month, according to the following method: The tonnage and average cost of coal or coke on hand at the beginning of a period is to be combined with the tonnage and average cost of coal or coke received during the period.

Prosecution in the courts and seizure of their businesses by the Government face retail coal dealers who defy the provisions of this order. The penalty fixed by the Food bill for such offense is a fine of not more than $5000 or imprisonment for not more than two years, or both. "Each independent transaction," the bill continues, "shall constitute a separate offense."

Machinery Men in Liberty Loan Campaign

The following men prominent in the machinery world constitute the machinery- and machine-tool-trades division of the Greater New York Liberty Loan Committee:

J. W. Lane, president E. W. Bliss Co., chairman; Henry Prentiss, president Prentiss Tool and Supply Co.; George Doubleday, president Ingersoll-Rand Co.; R. L. Patterson, president American Machine and Foundry Co.; C. I. Cornell, treasurer Pratt & Whitney Co.; Henry Fuller, vice president Fairbanks, Morse & Co.; John H. Lidgerwood, president Lidgerwood Manufacturing Co.; A. J. Babcock, president Manning, Maxwell & Moore; Norman Dodge, vice president Mergenthaler Linotype Co.; H. R. Swartz, president Intertype Corporation; George J. Low, F. M. Dyer & Co.; Charles A. Hirschberg, Ingersoll-Rand Company.

The bonds of the second issue are of two kinds, registered and coupon. The registered bonds will be registered at the Treasury in the names of their owners. Checks for the interest on these will be mailed from the Treasury to the owners each semiannual-interest date. The coupon bonds will be payable to bearer and will have coupons attached for the interest. The latter can be cashed like a Government check at any bank.

Bonds can be purchased by filling out an application blank made on the form prescribed by the Secretary of the Treasury, which can be obtained from any bank or Liberty Loan committee, and sending it or having it sent to the Treasury of the United States or any Federal Reserve Bank or branch accompanied by the payment of 2% of the amount of bonds applied for.

Wanted a National Junkman

"The nation needs a national 'junkman'," says James Keeley, the editor of the *Chicago Herald*, "although I suppose the kingdom over which he would rule would be described as the 'National Salvage Department.'

"The psychological effect of the creation of such a department at this time, contemporaneous with the floating of the second Liberty Loan, would be of inestimable value. It would be the Government's guarantee that, in so far as it is humanly possible, not one dollar of the millions that have been—and are to be—voted for materials necessary to the prosecution of the war will be wasted. It would be an official assurance that every dollar's worth of material not only will do 100 cents' worth of work but will be reëmployed until the vanishing point is reached.

"Of course, the army and navy have quartermasters' and inspectors' departments to look after the collection and disposal of material after it has been 'put out of action.' In peace times these departments have worked

efficiently and according to regulations, but regulations of peace do not fit war conditions. This has been demonstrated on the other side of the Atlantic, where similar departments in all armies have given place to independent organizations, which were needed to prevent the vanishing into thin air of valuable material, disabled but not destroyed.

"The salvage and reclamation of every fragment of metal on the fighting line in the rear and at home is a vital factor of transatlantic governmental activity. We are a wasteful nation, and the sooner we learn that material of all kinds is so precious it must serve over and over again, the sooner we will be doing our full share in the great campaign outlined by President Wilson."

War Cost and Wealth

"If we say that the wealth of the United States is $250,000,000,000, and that our personal incomes aggregate $40,000,000,000 per year, and that Congress expects to mortgage this wealth and tax these incomes to the extent of perhaps $14,000,000,000 and $3,500,000,000, respectively, during the fiscal year 1917-18, our minds give the statement no rational reception," says the Alexander Hamilton Institute. "If we say, however, that the taxes will be 10% of our incomes and that the Government bond issues will be equal to a mortgage of 5.6% of our national wealth, it is easy to calculate whether or not each one of us personally is buying his share of bonds and paying his proportion of taxes to the Federal Government in addition to local taxes.

"On the basis of the foregoing estimates the national debt of the United States next June per inhabitant will be about $126, as compared with nearly $600 in England and France. Russia is facing a financial crisis because of lack of liquid wealth but, owing to a large population, her per capita debt is only about $125.

"The end of the first year of the war will find the United States Government with a relatively much smaller debt than England and France. Our taxes will amount to $31 per capita, which is nearly as heavy as in France though much less than in Great Britain. Since the American people enjoy a much larger income per person, however, the per cent. of taxes on our incomes is much less than in any European country."

Industrial Expansion in Austria

The chemical industry played a minor part in the economic life of Austria prior to the war, and undertakings in the line were few and small compared with those in Germany. "On the outbreak of war this condition was realized and the industry has since undergone a tremendous revival and expansion," to use the words of a translation from the German by the *Chemical Trade Journal*. The absence of certain raw materials, such as saltpeter, caused a search for a substitute. New plants were erected and existing ones enlarged. Nitric acid and nitrate of lime were made from air on a scale undreamed of in peace times. Sulphuric-acid production was enormously increased. Factories were built to make benzol, toluol, glycerine, acetone and for the production of sulphur and chlorine. The mineral wealth of the country was exploited to a much greater extent than before; the sulphuric-acid industry was rendered largely independent of foreign pyrites; and lead, copper and other metals were obtained. The Galician petroleum wells supplied the whole of the Central Powers with oil for light, power and lubrication.

Camouflage and War Risk at Sea

The art of camouflage is not confined to land. It is used at sea to dodge the submarine. It will be a factor in marine war-risk insurance. Deceptive painting of vessels is included with arming and smoke-box equipment in the instructions of the United States war-risk bureau. Shipowners who disregard these instructions will pay higher premiums on hulls and cargoes. It is said that painting of a "chameleon" sort has been tried in European waters with success. Instead of leaden hue, liners are painted in squares of red, green and brown with a sky-blue background so that at a distance the vessel blends with sky and sea. To reduce visibility heavy waves are painted along the sides. All is according to formula and with careful study of each ship's needs.

Waterways Must Help Railroads

"Business America," said Walter Parker, of the Department of Commerce, at the Atlantic City business convention, "must augment its transportation system and reduce it to a dependable, convenient and economic basis if domestic markets are to be kept in order and if the gate to foreign markets during the period of keen competition after the war is to be kept open. This means that the inland navigable waterways of the United States must be used as an adjunct to the railroads, and in coördination with the railroads, and that a system of transportation must be developed under which transportation lines of least natural resistance and cost of operation, in relation to the service required, will function without friction and without unnecessary restraint."

Germans Seek To Buy Minerals

"Germans are endeavoring to obtain supplies of materials for munitions and building from different parts of the world," said Dr. Christopher Addison, Great Britain's minister without portfolio in charge of reconstruction, in the course of a recent speech. "The Germans have been and still are making efforts to acquire control of great mineral deposits, even attempting to purchase them in England during the war."

British Steel Industry Expands

About $70,000,000 additional capital has been invested in the British steel industry since the war started, according to the report of the British Steel Smelters' Society. Production does not satisfy the needs of the Government, it is stated. The additional plant and the demands of the military authorities have caused a shortage of labor and many men have been brought back from the army to help supply the deficiency. Thousands of women have been employed in the steel plants, but there are many positions that they cannot fill.

Industrial News from Washington

By Paul Wooton, Special Correspondent

Sulphuric Acid in the West

Markets for sulphuric acid in the West are expanding on a scale which has greatly encouraged all operators of smelteries in that section, according to A. E. Wells, superintendent of the Salt Lake City station of the United States Bureau of Mines, who recently visited the principal plants in the Northwest. As all of these smelters have had to face complaints regarding smoke damage, he finds that they are ready to make larger investments in acid plants even when small profits are to be expected. Present market conditions have made it possible for domestic smelters to meet practically the entire demand of the Pacific coast.

The smelters in the intermountain states are finding an outlet for acid through the manufacture of high-grade superphosphates which are now being shipped into the Middle West. The increasing use of sulphuric acid in leaching the oxidized overburden at the Utah Copper Co.'s properties, as well as at other mines, and in the leaching of sand tailings are developments on which operators are pinning their hopes of greater consumption. Many are confident, according to Mr. Wells, that the direct application of sulphuric acid as a fertilizer is sure to come into general use on certain soils, thereby furnishing a larger Western market for the byproduct. If this market be provided, Mr. Wells believes that existing smelteries could produce 12,000 tons of 60° acid daily, after necessary equipment has been installed.

Lake Superior Station To Study Alloy Metals

Sufficient importance is attached to the manganese situation by the United States Bureau of Mines to cause it to set aside entirely its program for the Lake Superior station, which was prepared in peace times, to make way for a study of alloy metals. Although the work will pertain largely to manganese, much attention is to be given the study of substitutes for that metal in making steel. Edmund Newton, superintendent of the new station, has returned to his post at Minneapolis after extended conferences with Bureau officials, during which the wartime program of the Lake Superior station was formulated.

As the first step the Bureau has begun assembling all available information regarding the character and quantity of domestic manganese ores and their mining and concentration, as well as data on steel manufacture. Particular attention is to be given to a series of experiments on a basic pig iron having a high manganese content. It is hoped to demonstrate that the use of such pig iron will make possible the addition of less alloy on account of the large quantity of residual manganese in the bath metal. Thermochemical data relating to manganese and its compounds are to be determined. The equilibria of certain reactions between iron and manganese compounds will be the basis of important research. The greater part of the work will look to employing intermediate-grade alloys in making steel. Production of alloys in the electric furnace will also be studied.

Testing Chalcopyrite-Pyrrhotite Ores of Southern Oregon

Results of extensive experiments by Will H. Coghill on the flotation of chalcopyrite in the chalcopyrite-pyrrhotite ores of southern Oregon are to be announced in the near future by the United States Bureau of Mines. "Chalcopyrite is the copper-bearing mineral at many places in southern Oregon; often it is intimately associated with pyrrhotite and pyrite. In places these two gangue minerals form as much as 75% of the ore, so that the vein is almost wholly sulphides," says Mr. Coghill, discussing his work. Continuing, he says:

> Gravitation methods of concentrating the copper-bearing mineral cannot be applied because the gangue sulphides have practically the same density as chalcopyrite. Magnetic separation does not seem practicable—assuming that the gangue sulphides can be made to respond naturally or by a preliminary treatment to an electromagnet—because fine grinding is required to liberate the mineral grains. The methods of concentration now in vogue are hand sorting and jigging, which eliminate some of the siliceous gangue. An inspection of the smelter returns in the possession of mine operators gives the impression that the average grade of ore shipped runs 10% copper.
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> The experiments on separating the chalcopyrite from the gangue by flotation have been carried through the preliminary laboratory stage with flattering results. As a mill is never considered complete and finished until the orebody is exhausted and the mill has served its purpose, so in this and in other ore-testing experiments there are still undetermined factors. However, in order that those who are interested in the separation of sulphides by flotation may have the results of the laboratory work before them, a preliminary report is to be made public soon.

Metal Statistics to be Furnished to War Industries Board

Arrangements have been completed whereby the principal producers of copper, lead and zinc will furnish each week, through the United States Geological Survey, confidential information for the use of the War Industries Board. As to this, Director George Otis Smith said: "Judging from personal interviews, as well as from correspondence on the subject, the metal industries are anxious to coöperate most heartily and most effectively with the Government at this time, when the national need for war materials is so urgent." C. E. Siebenthal will compile the weekly reports for lead and spelter. B. S. Butler will handle the copper figures.

A Conference on the Explosives Act has been called by Van H. Manning, director of the United States Bureau of Mines, to meet in Washington on Oct. 16 to draw up the details of administering the act. Representatives of all industries and organizations concerned have been invited to attend.

Editorials

What of Copper Supply?

A VALUED correspondent writes us expressing surprise at our article of last week in which we ventured the opinion that 23½c. for copper might fail to maintain the production that is needed. "Do not you know," says he, "that producers will exert themselves to their utmost? Do not you know that in 1916 producers realized stupendous profits on 25c. for copper; and, considering their magnitude, how can you think that a cut of only 1½c. per lb. will affect the situation materially?"

To these pertinent questions we reply that every producer with whom we have talked has expressed the intention of exerting all possible efforts. And, furthermore, we are convinced that at 23½c. there will be profits that will still be enormous, although not so large as in 1916. This answers the questions. However, what neither the questions nor answers have brought out is a feature in our economics that has not been adequately considered heretofore.

The imperfect view of the situation in copper is due to attention being centered upon the big producers while the miscellaneous production has been disregarded. Now it is quite true that the big producers are responsible for the major part of the production, perhaps 90% of it, but the output of the small producers is not inconsiderable and at any given time, when the market is in equilibrium, their output has a great deal to do with determining the price. It may be considered, moreover, that when the market is in equilibrium there are always some producers who are simply getting a new dollar for an old one.

Now it is, of course, impossible to say positively whether the market was in equilibrium previous to the Government's intervention. Ever since 1916, when copper began to be contracted in stupendous blocks for excessively long periods ahead, we have had an unbalanced market, i.e., a very large proportion of the supply was subtracted and quotations were subsequently established on relatively small transactions, which became higher than otherwise they would have been. This was to the advantage of the small producers, who dispose generally of their product on the quotational average. Thus, in comparing with 1916, while the big producers set 23½c. against 25c., the small producers set it against 27.2c. Just before the Government's announcement the price for copper had sunk to 24c. but had rallied to 26½c. on very small buying. Conditions for several months previous had been extraordinarily confused. There had been a prolonged absence of important buying, production had been seriously curtailed by the strikes, and the uncertainty respecting the policy of Washington overshadowed everything. It is probable that the market was not in a condition of equilibrium, for it did not exhibit the essential condition and infallible index, viz., an accumulation of unsold stock, but at the beginning of 1917 there were plenty of signs that it was on the way to regaining a normal state.

The prices for copper that prevailed in 1916 undoubtedly brought out a surplus production. This was manifest in the statistics of blister-copper production and also in the reports of accumulations of ore in the hands of smelters, so that the latter refused to take in more ore. Since then, however, there has been a change. The cost of production has increased, the supply of labor has decreased, the price for copper has shrunk, and smelters have reported that the supply of ore offered to them is less bountiful. This tends to indicate that under recent conditions the sundry supplies of copper have shown a tendency to contract.

Now, three years ago, even one year ago, any suggestion that a price around 25c. would be anything but a stimulus to unrestrained production would have been regarded as humorous. It is not so today. We are informed respecting at least one company of considerable output whose present cost is 23c. per lb., and it is not unlikely that one of our major districts, viz., Clifton-Morenci, is actually confronted with conditions that may make the present price an unprofitable one. The mines of that district are still idle, their labor troubles not yet having been settled.

Another direction in which contraction of copper supply may be feared is in the importation from South America. Some of that copper is high-cost copper and natural difficulties have been further enhanced by the depreciation in those countries of the American dollar. Quite aside from that, however, is the fact that our business in crude copper with those countries has been built up by dint of hard effort and by the creation of complicated market machinery. That machinery cannot be wrecked, as it has been, without interfering with the supply.

The feature in the economics of the situation that has been overlooked is this: The same inflation that affects price also affects costs and in doing so widens the spread among the costs of the several producers. Thus, if before the war one producer had a cost of 10c. and another a cost of 15c., their present costs might be 16 and 24c. respectively. The high-cost producer would be losing money at 23½c. just as formerly he lost money at 14½c., but the low-cost producer would be making 9c. per lb. profit against 4½c. formerly. This illustrates how such companies as Anaconda and Utah, and the other porphyries can properly regard 23½c. as a reasonable, even generous, price, and how they may continue to show earnings not very much short of their stupendous returns in 1916 when they got 25c. for their copper, while a small producer who got 27.2c. in 1916 and made a moderate profit may lose money at 23½c. and even may be compelled to suspend production.

If there were a free market for copper and if production had begun to exceed demand, with the result that prices were declining, small producers would begin to be extinguished and production trimmed down to fit the demand at figures that would still leave very fine margins for the big producers. We mean, of

course, margins expressed in dollars and distributed as such in dividends, not losing sight of the fact that the stockholders receiving those dividends would not be able to buy with them any more than with the smaller dividends of yore.

It may be suggested that the big producers, who find 23½c. a satisfactory price, will produce all the copper that is needed, increasing their output if necessary. It is doubtful if they can. Early in this year it began to look as if they had reached the limit of their capacity. Their plants and personnels had both been strained to the utmost, and their ability was showing signs of deterioration. Nine months ago it was forecasted accurately that consumers had overbought, but the other forecast of a further increase in production was early known to be wrong. Whatever be the contributory causes, and they are most complex, the plain fact remains that at the present time we do not possess enough copper and domestic consumers have been officially told that during the next three months at least they must get along with a curtailed supply.

Bungling Legislation

THE House of Representatives enacted the most colossal revenue bill in the history of the United States, without giving any intelligent consideration to the subject and without knowing just what it was doing. This was admitted by the leaders of the House, who said that they were leaving it to the Senate to study the question and fix things up. The Senate did so and framed and enacted a bill that was admittedly a great improvement over what the House of Representatives had done blindly. Then came the question of reconciling the differences in the bills passed by the House and by the Senate, which, as usual, was attended to in a conference between delegates of the two bodies. These delegates, or conferees, rewrote the bill entirely with respect to its major chapter and made radical changes in other details. The revised bill, as drafted by the conferees, went back to the two legislative bodies, which adopted it unanimously and without any previous discussion except a few remarks of a perfunctory character. Members of both the Senate and the House said that there were provisions in the bill that were highly unjust, dangerous and, in brief, "perfectly rotten," but they said, "Let's pass them, enact them into law, and then repeal them when we meet again."

This is a curious side light, or should we rather say spot light, upon the fidelity of mentality of the legislative body of the Great Republic. Any person of decision and habit of clear thinking would say that if something is known to be bad, the logical thing to do would be to refuse to enact it. But to enact it with the avowed intention of repealing it a few months later is humorous. It is as if one had a glass vase on a table that it was desired to clear off and should say, "I will sweep off everything to the floor, the vase included. It is true that I do not desire to break the vase, but, nevertheless, I am going to do so, considering that I can pick up the pieces and stick them together again." Yet when similar exhibitions of thought are communicated to us from the Congress of Workmen's and Soldiers' Delegates in Petrograd, we find it highly humorous.

While the revenue bill was in conference an article crept in that seems to require the professional man—the lawyer, surgeon or engineer—and the salaried man to pay a tax of 8% on professional or occupational income in excess of $6000, this tax being in addition to the regular income tax on a graduated scale. Nobody—not even the conferees—seems to know just how this article was introduced and there is doubt respecting its meaning and application, wherefore there will probably be litigation regarding it.

The point to which we now call attention is this. Here is a tax that may fall grievously and unfairly upon an important class of people. It was not originally introduced or debated in either house of Congress. It was subsequently written in by a joint committee and when its revised bill was referred back to the two houses they adopted it without knowing what it contained. One hundred and forty-two years ago we revolted on the grievance of taxation without representation. We now seem to have got taxation by star-chamber proceedings with our duly elected representatives mechanically assenting and not knowing what they are doing.

The Special Tax on Professional Men

WE HAVE above referred to the special tax on salaried and professional men that was slipped into the revenue bill by the conferees and adopted by Congress without debate. In behalf of a large class of professional men we protest against this tax. We feel sure that the spokesmen of all other professional men will unite with us in this. Professional and salaried men are as patriotic as any others and have no desire to evade or escape taxation necessary to carry on the war, but this tax is too unjust, too inequitable and was imposed in too surreptitious a way.

After this class has paid all the consumption taxes that fall on everybody, after it has paid its income tax and surtax, it is called upon to pay 8% of salary or earnings in excess of $6000. A man with a salary, or professional income, of $15,000 will be required to pay an income tax of $730 and then an occupational tax of $720. A man with an income of $15,000 from 3½% Liberty Bonds will pay nothing at all. The drone who does nothing but draw his income from investments pays only the regular income tax. The worker pays the income tax and then repeats. The slick gentlemen who concealed this joker in the revenue bill took precious good care to exempt congressmen, to exempt themselves, from its terms.

This tax is practically a retroactive tax for it is collectible for the entire year of 1917, although it was not enacted until the year was three-fourths gone and then was enacted without any previous warning. There will be found salaried and professional men, who live up to their means, or have already invested their surplus earnings for 1917, who have been putting something aside for payment of their income tax but will be unable to pay this extra tax except by liquidating such investments as they can or else by borrowing money for the purpose.

The Hon. Claude Kitchin appears to be responsible for this special tax. It appears under the title of "War Excess Profits Tax." This is another joke on profes-

sional men. Most of them have enjoyed no increased income due to the war but, on the contrary, have suffered increased expenses that have had to be paid out of a stationary income. The sneaking character of this occupational tax is exhibited by its not being stated explicitly in the revenue bill, being left to the inference of synthesis. Sec. 209 provides that "in the case of a trade or business having no invested capital" a tax shall be paid "equivalent to 8% of the net income of such trade or business in excess of" $6000 in the case of a domestic partnership, or a citizen, or a resident of the United States. Under Sec. 200 it is provided that "the terms 'trade' and 'business' include professions and occupations." Thus the trick was done. Elsewhere provision is made for the exempt class of Government employees and *members of Congress!*

Mexico's Tendency Toward Confiscation

THE Mexican congress has recently passed a bill—particulars of which will be found on another page—providing for the "temporary" taking over and management of all industrial properties whose owners refuse to operate them. In an accompanying circular the reasons for this action are set forth.

This is of particular interest to Americans, not so much in itself as in its possible significance. No one will be apt to quarrel with the Mexican government's concern over the dangerous idleness caused by non-operation of industrial properties. This is eminently right and proper but the measure has served to give rise to certain disquieting speculations on the part of some observers.

What causes the sincerity of the law to be called in question is the fact that the companies affected refuse to operate only when conditions are intolerable; and these conditions—theoretically, at least—are under the control of the Mexican government. Another and still more practical view lies in the consideration that if these companies, with extensive experience and efficient management, cannot operate successfully, it may be safely assumed that the government, with a total lack of both advantages, cannot operate successfully either.

It would seem that if the Mexican government wants these companies to operate, it might be well to provide working conditions which would make successful operation possible. This being so, it would appear that the government is attacking an effect rather than a cause, and is mistaking the relative positions of the cart and the horse.

The main question is whether the law is merely an emergency measure, hastily constructed to remedy temporary conditions, or whether—as some affect to have discovered—it is a disquieting forecast of a definite policy of the Mexican government that will eventually eliminate foreign ownership of mines and industries.

This latter conclusion seems to be rather an alarmist view of the situation. If any intelligence is granted to the Mexican government, it must be assumed that it fully appreciates the vital necessity of foreign capital for the future development and welfare of the country. And it must be fairly obvious—even to a Mexican legislature—that the only available capital under present conditions is American.

BY THE WAY

The smelters of Miami, when they struck recently, exhibited their ideas of patriotism by abandoning their furnaces just as they were, without any preparation for a shutdown. As a consequence, the arches of the reverberatories fell in. Such an occurrence at a time when the country needs to keep its plant in the best of order and highest state of efficiency produces an uncomfortable feeling.

The striking miners in Arizona demanded $6 wages for a six-hour day, with the idea of securing ultimately a two-hour day with, of course, $6 pay. They had other grievances and demands. One of them was for abolition of the carbide lamp. Their objection to that useful, economical and sanitary means of illumination is mysterious and unknown. There is a suspicion that it has something to do with the old custom of taking home a pocketful of candles. When there are no candles in the mine, there are none to be purloined. Besides, the miner is required to put up a deposit of $1 for his carbide lamp, and if he loses the lamp he loses his deposit. We ourselves have to do the same thing with respect to several keys and other things. We think of interesting Miss Rankin in taking up this abuse of power by the corporations.

The red card carried by I. W. W. members appears on first thought to have no relation to railroad operations or dividends; yet on reconsideration it will be seen that it has an important bearing on railroad revenues. This red badge of membership has little in common with the "red badge of courage," made famous by Stephen Crane, except in the frequent loss of red blood. In this respect, it has considerable meaning in various mining and industrial centers. The I. W. W.'s red card, like its more respectable counterpart, the union card, passes current in many places as a franking privilege for a "touch," an occasional drink, or for a railroad ride in side-door pullmans. Owing to the taste for violence on the part of many I. W. W.'s, it is stated that railroad crews exhibit a particular apathy about putting off those carrying the "little red card." The franking privilege of the red card enables its holders to congregate at mining and industrial centers readily and thus precipitate strikes which may be much more important to the railroad than the loss of the passenger fares of I. W. W. members. Let us remember that the mines of the country are the best and greatest producers of tonnage for the railroads. The special work of the I. W. W. is the perpetual promotion of strikes. Strikes mean interruption of production, and, to the railroads, loss of tonnage. The recent idleness of the mines at Butte, at Miami and Globe, at Clifton and Morenci, and at Bisbee, all bear a more or less close relation to the influence of the I. W. W. propaganda. Wherever bearers of the "little red card" foregather, the strike "storm signal" may be hoisted and a red-ink entry looked for in the local books of mining and transportation companies. It behooves the railroads to look into the ravages of this "boll weevil" of the industrial field, and take some steps to restrict its migrations.

A. I. M. E. Meeting at St. Louis

The 115th meeting of the American Institute of Mining Engineers, held at St. Louis, Mo., on Oct. 8 and 9, was attended by over 300 Institute members and guests. A special train left the Pennsylvania station, New York, on Saturday afternoon, picking up *en route* many of the Eastern members at Philadelphia, Harrisburg, Pittsburgh, Columbus, Indianapolis, and arriving in St. Louis late Sunday afternoon.

The registration of visitors took place on the parlor floor of the Planters Hotel in St. Louis, and an unusually large number of members were in attendance from Mississippi Valley and Lake Superior regions. The Woman's Auxiliary of the Institute accompanied the party and was also well represented at St. Louis. The ladies were received by a special entertainment committee, headed by Mrs. P. N. Moore.

The committee on arrangements, of which H. A. Buehler was chairman, prepared an elaborate program of visits to outlying mining districts, accompanied by daily technical sessions and a number of social entertainments.

On Monday morning, two simultaneous sessions were held at the Planters Hotel at 10 a.m., at which were read and discussed papers on milling and on coal. O. M. Bilharz presided at the milling session and the papers presented were as follows:

The Hancock Jig in the Concentration of Lead Ores. By Harold Rabling.

The Concentration Practice in Southeast Missouri. By A. P. Watt.

The Milling Practice of the St. Joseph Lead Co. By L. A. Delano.

Ore-Dressing Practice in the Joplin District. By C. A. Wright.

A Standard Screen Scale for Testing Sieves.

A Uniform Sizing Diagram for Different Screen Standards. By John Randall.

A discussion as to the consumption of steel in ball and Marathon mills was engaged in by H. S. Cole, H. N. Spicer, L. A. Delano and A. P. Watt. It was claimed that in a 10,000-ton run the consumption was 0.9 lb. cast-iron balls and 0.25 lb. steel rods per ton. The rods were removed when worn to ½ in. and represent 10% original weight or 0.3 lb. discard. When grinding from 10 to 2 mm., the wear on liners was too little to remove in the time operated. At 400 tons per day distortion of rods occurred only when they were not removed when worn to ½ in. or when not placed parallel at start.

The session on coal was in charge of Thomas T. Brewster, and the papers read were:

The Effect of Anti-Friction Bearings on the Haulage of a Coal Mine. By P. B. Liebermann.

Coal Wastage. By Francis S. Peabody.

Steam Shovel Mining of Bituminous Coal. By H. H. Stoek.

Merit Rating of Coal Mines Under Workmen's Compensation Insurance. By E. C. Lee.

The Coal Industry of Illinois. By C. M. Young.

Luncheon followed the close of the first session, and a special patriotic meeting was held in the afternoon. On Tuesday morning simultaneous sessions on lead and petroleum were held at the Planters Hotel, presided over respectively by Arthur Thacher and A. F. Lucas. A meeting of the Woman's Auxiliary for organization was held simultaneously with these sessions. At the lead sessions the following metallurgical papers were presented:

Tredinnick-Pattinson Process. By William E. Newnam.

Lead Mining and Smelting at Galetta, Ont. By William E. Newnam.

The Metallurgy of Lead Ores in the Lower Mississippi Valley. By Herman Garlichs.

The Media Mill, Webb City, Mo. By H. B. Pulsifer.

Salt in the Metallurgy of Lead. By Oliver C. Ralston, Clyde E. Williams, Marvin J. Udy and G. J. Holt.

At the petroleum session were presented papers on:

The Practical Value of Oil and Gas Bureaus. By W. G. Matteson.

A Review of the Exploration at Belle Isle, Louisiana. By A. F. Lucas.

A Feasible Plan for Gaging Individual Wells. By Roswell H. Johnson and W. E. Bernard.

Geosynclines and Petroliferous Deposits. By Marcel R. Daly.

Funnel and Anticlinal-Ring Structure Associated with Igneous Intrusions in the Mexican Oil Fields. By V. R. Garfias and H. J. Hawley.

In the afternoon a boat trip to the Herculaneum smeltery of the St. Joseph Lead Co. was attended by a large number of members. The party returned to St. Louis in the evening having supper, followed by dancing and by a technical session at 8 p.m. on board the boat. A number of interesting papers were presented at this meeting, namely:

Comparative Tests of Hammer Drill Bits. By C. R. Forbes and J. C. Barton.

Mine Models. By H. H. Stoek.

Mining Methods of the American Zinc Co. of Tennessee. By H. A. Coy and H. B. Henegar.

Increasing Dividends Through Personnel Work. By T. T. Read.

Methods of Determining the Capacities of Slime-Thickening Tanks. By R. T. Mishler.

Influence of Base Metals in Gold-Bullion Assaying. By Frederic P. Dewey.

Graphic Solutions of Some Compressed-Air Calculations. By C. W. Crispell.

Tests on the Hardinge Conical Mill. By Arthur F. Taggart.

The Enrichment and Segregation of Mill Tailings for Future Treatment. By F. E. Marcy.

Resistance of Artificial Mine-Roof Supports. By W. Griffith.

A Study of the Microstructure of Some Clays in Relation to Their Period of Firing. By H. Ries and Y. O. Oinouye.

The History and Legal Phases of the Smoke Problem. By Lugon Johnson.

Zinc Dust as a Precipitant in the Cyanide Process. By W. J. Sharwood.

Experiments in the Recovery of Tungsten and Gold in the Murray District, Idaho. By R. R. Goodrich and N. E. Holden.

A special session was held, at 2 p.m., of the War Minerals Committee, consisting of William Young Westervelt, chairman; Alfred G. White, secretary; W. O. Hotchkiss and David White. At the meeting of this committee, information on mineral resources of the United States as presented by various engineers from personal knowledge through examinations and reports made, was collected, condensed and classified for the purpose of determining the relative importance of different properties from the standpoint of mineral production.

On Wednesday an automobile trip was arranged by the Woman's Auxiliary, a visit by its members to the Art Museum and to private galleries, and a reception for all members at the residence of President and Mrs. P. N. Moore, at 3125 Lafayette Ave., St. Louis. An all-day trip of inspection to Illinois coal mines was planned for coal members, together with an optional visit to steel works, lead and zinc smelteries and other industrial plants in St. Louis and vicinity.

On Wednesday afternoon, simultaneous sessions on ore deposits and on iron and steel were held at the Planters Hotel, these papers being read:

Exploration of Metalliferous Deposits. By W. H. Emmons.
The Pyritic Deposits Near Röros, Norway. By H. Ries and R. E. Somers.
The Sulphur Deposits in Culberson County, Tex. By William B. Phillips.
Ore Deposits of the Boulder Batholith of Montana. By Paul Billingsley and J. A. Grimes.
A New Silicate of Lead and Zinc. By P. A. van der Meulen.
The Effects of Cross Faults on the Richness of Ore. By E. K. Soper.
The Replacement of Sulphides by Quartz. By H. N. Wolcott.
Geology and Mineral Deposits of the Ozark Region. By H. A. Buehler.
The Ferrous Iron Content and Magnetic Susceptibility of Some Artificial and Natural Oxides of Iron. By R. B. Sosman and J. C. Hostetter.
Zonal Growth in Hematite and Its Bearing on the Origin of Certain Iron Ores. By R. B. Sosman and J. C. Hostetter.
The Tayeh Iron Ore Deposits. By Chung Yu Wang.
Manganiferous Iron Ores of the Cuyuna District, Minn. By E. C. Harder.
The Supposed Reversal of Inheritance of Ferrite Grain Size from That of Austenite. By Henry M. Howe.
Some Unusual Features in the Microstructure of Wrought Iron. By Henry S. Rawdon.

The convention train left St. Louis Wednesday night to inspect the zinc mines of the Joplin district, the southeast Kansas coal field and the Oklahoma oil fields. For the Joplin and Tulsa technical sessions, the following papers were scheduled for the zinc and petroleum divisions:

The Zinc Ores of the Joplin District. By W. George Waring.
Development and Underground Mining Practice in the Joplin District. By H. I. Young.
Oxide of Zinc. By G. C. Stone.
Zinc Burning as a Metallurgical Process. By W. R. Ingalls.
Some Economic Factors in the Production of Electrolytic Zinc. By R. G. Hall.
Zinc Mining at Franklin, N. J. By C. M. Haight and B. F. Tillson.
Characteristics of Zinc Deposits in North America. By Frank L. Nason.
The New Jersey Zinc Co.'s Franklin Laboratory. By D. Jenkins.
Palmerton Zinc Refractories. By C. P. Fiske.
A Few Notes on the Future Work of the Petroleum Geologist in the Mid-Continental Field. By Dorsey Hager.
Geologic Structure in the Cushing Oil and Gas Field, Oklahoma. By Carl H. Beal.
Granite in Kansas Wells. By Park Wright.
Review of Present Knowledge Regarding the Petroleum Resources of South America. By F. G. Clapp.
The Estimation of Petroleum Reserves. By Robert W. Pack.
The Southern Extremity of the "Clinton" Gas Pools in Ohio. By L. S. Panyity.
Relation of Sulphur to Variation in the Gravity of California Petroleum. By G. Sherburne Rogers.

On Friday the Cosden oil refinery was to be visited and the final technical session held at 8 p.m. Saturday was to be devoted to a visit to the Cushing oil field, the convention party disbanding Saturday evening at Depew.

Mexican Embargo on Gold and Silver

A dispatch from the Treasury Department of the Mexican government to Ambassador Bonillas, at Washington, states that the President of the Republic has issued the following important decree:

Whereas, due to the rise in the price of silver, it becomes urgent to effect radical changes in our monetary system, restricting, as far as possible, the exportation of specie, and striving by all reasonable means to import the same; and

Whereas, at present the balance of trade in foreign business is in favor of Mexico, it is imperative that exporters, especially of precious metals, be enabled to collect at least a part of their shipments in gold coin or bullion, while permitting, if the country's need should exact it, to require the reimportation of specie in connection with sundry articles of export, I have deemed it proper to decree as follows:

Art. I—The general prohibition to export any gold or silver coin of Mexican mintage continues in full force.

Art. II—From the date of the present decree the exportation of gold bars is absolutely forbidden.

Art. III—Exporters of ores and concentrates of any kind containing gold of a value exceeding six grams per ton will be under obligation to reimport to Mexico in gold bars suitable to mintage, or in Mexican or foreign gold coin, a sum equivalent to the gold produced, according to respective assays, by the ores or concentrates which may have been exported.

Art. IV—Exporters of silver bars or ores and concentrates containing silver of a value exceeding 50 grams per ton shall be under the obligation to reimport in mintable gold bars, or in national or foreign gold coins, 25 per cent. of the value of the silver contained in the bars, ores or concentrates which may have been exported.

Art. V—For settlements of gold to be imported there will be taken as silver basic price the same which may have been fixed by the Treasury Department to collect taxes at the time of export of the corresponding metal.

Art. VI—Exporters of the metal in bars or of the ores and concentrates of gold or silver shall submit to the custom house through which they may export, or at the Treasury Department, a bond for the value of the gold which they are to reimport.

Art. VII—Gold imported shall be delivered for mintage at the National Mint within the 30 days following date of importation. The mint shall charge importers solely the minting charges.

Art. VIII—Reimportations shall be effected within the 10 days subsequent to exportations, after which nonfulfillment of the obligation to reimport shall be penalized by the cashing of the amount of the bond and crediting said sum to Government as befitting a fraudulent exportation.

The Assistant Secretary, R. NIETO.

Foreign Trade in Copper

Exports of copper from the United States in June, July, 1917, and the first seven months of the year, are reported by the Department of Commerce as follows:

	June Lb.	July Lb.	Jan.-July Lb.
Ore and concentrates, contents	587,357	293,200	3,504,388
Unrefined, in bars, pigs, etc	.....	277,980	5,273,679
Refined, bars, etc	89,532,200	54,275,337	631,947,908
Old and scrap	46,974	2,240	865,835
Plates and sheets	700,932	2,302,153	19,490,032
Pipes and tubes	*a*	2,782,255	*a*2,782,255
Wire	1,961,517	1,773,447	17,110,110
Total	92,828,980	58,924,357	678,191,952

a First reported separately in July.

The weight of ore exported in July was 3274 tons; no concentrates.

Imports of copper in June, July and the first seven months of 1917 were as follows:

	June Lb.	July Lb.	Jan.-July Lb.
Ore and concentrates, contents	14,466,518	8,686,134	86,559,636
Matte and regulus, etc	1,141,067	797,982	11,252,07[illegible]
Unrefined, in bars, pigs, etc	44,779,479	10,122,230	215,207,353
Refined, in bars, etc	320,935	46,865	4,009,660
Old, etc., for manufacture	3,454,978	2,488,410	14,336,83[illegible]
Composition metal, copper chief value	15,548	492,092	654,644
Total	64,178,525	22,633,713	332,020,090

Material imported in July was 27,758 tons ore, 10,330 tons concentrates and 963 tons matte and regulus, etc.

Victoria Mineral Output, 1916

The mineral output of Victoria, Australia, during 1916, according to the Secretary for Mines, was as follows: Gold, 256,643 fine oz., a decrease from 1915 of 72,425 oz.; silver, 8746 fine oz.; coal, 417,183 long tons; antimony ore, 12,382 (yielding 3259 tons concentrates); tin ore, 122 long tons; wolfram, 3 long ton; gypsum, 1853; brown coal, 2915; magnesite, 100; kaolin, 810; manganese ore, 85 long tons.

Personals

J. S. Coupal has returned to New York from examination work in Arizona.

Louis E. Garbrecht is making examinations in the Pispis mining district of Nicaragua.

Chuang Yen has joined the engineering staff of the Winona Copper Co. in northern Michigan.

Maj. Reginald W. Brock is giving a course in a school for commanding officers in England.

W. B. Phelps is superintendent of mines for the Tom Reed Gold Mines Co., at Oatman, Arizona.

Herbert G. Thomson has been appointed general superintendent of the Nevada Packard Mines Company.

David W. Brunton, of Denver, Colo., is spending a few weeks in New York, making his headquarters at the Engineers' Club.

L. V. Rorke has been appointed by the Ontario government to the position of director of surveys, succeeding the late G. B. Kirkpatrick.

R. D. Park, of the engineering staff of the United Verde Copper Co., has received a commission in the Engineer Corps of the United States Army.

Henry Geisendorfer, manager of the Calavada mine in the Luning district, Nevada, has been in New York in conference with the officials of the company.

John H. Rodgers, formerly at Ishpeming, Mich., is now manager of the McComber mine on the Vermilion Range, between Tower and Ely, Minnesota.

Harold C. Cloudman, mining and civil engineer of San Francisco, has been commissioned captain in the Engineer Corps, U. S. A. He was but recently appointed as land classifier of the U. S. Geological Survey.

William C. Ralston, of New York, has been in Nevada where he has been preparing for the installation by the Unevida Gold Mining Co. of a plant for recovery of quicksilver and amalgam from the Carson River.

D. E. Charlton, for the last five years safety engineer for the Oliver Iron Mining Co. in the Virginia (Minnesota) district, has accepted a position on the editorial staff of the "Engineering and Mining Journal."

C. E. Stuart, superintendent of the Bonanza unit of the American Smelting and Refining Co., in Zacatecas, Mexico, has been commissioned a captain in the Engineer Officers Reserve Corps and is now at Fort Leavenworth.

George E. Farish, of New York, sailed on Oct. 2, on the S.S. "Peru" for Salvador. He is accompanied by **R. R. Leslie** and **U. A. Fritschi,** and will examine the properties of the Butters Divisadero Co. in the interest of his New York clients.

N. W. Sweetser and **W. M. Stephen,** mining engineers representing the Granby Consolidated company, have examined some copper prospects in the Whitehorse district, Yukon, with a view to their being taken over by the company.

H. E. Linden, of the Beckman & Linden Engineering Corporation of San Francisco, is making an extended trip through the East in the interest of his own company and of the Pacific Electro-Metals Co., of which the corporation is the engineer and manager.

Gerald G. Dobbs, formerly superintendent of the Raimund mining division, Republic Iron and Steel Co., southern district, has resigned to accept the position of superintendent of the Goudreau mine, at Goudreau, Ont., for the General Chemical Co., New York.

H. C. Perring, who has been superintendent of construction of the Pacific Gold Dredging Co. for several years, has been appointed general superintendent, succeeding the late O. C. Perry. The Pacific Gold Dredging Co. is the California subsidiary of the Yukon Gold Company.

Capt. Gerard W. Williams, formerly general manager of the Mount Oxide mine, in Queensland, Australia, has been awarded the Military Cross for distinguished service on the Somme front. He was commissioned in the Royal Engineers, having enlisted soon after the outbreak of the war.

M. J. Falkenburg, of Falkenburg & Laucks, chemists and engineers of Seattle, Wash., has gone to Anchorage, Alaska, in the interests of the Alaskan Engineering Commission. Falkenburg & Laucks, through Hildreth & Co., of New York, are inspecting materials of all kinds used in the construction of the Government Railway in Alaska.

Associated Geological Engineers make the following announcement concerning members of their staff: **Ernest Marquardt,** now in Wyoming, has been drafted after passing his examination for the Officers' Reserve Corps; **David Elliot Day,** recently attached to the staff of M. L. Fuller in West Virginia, expects to sail for France soon on special work; **J. M. Callihan** enlisted in the Seventh (New York) Regiment and has gone to camp at Spartanburg, S. C.; **F. G. Clapp** is a corporal in the Veteran Corps of Artillery of the State of New York, and is called into service from time to time in the vicinity of New York.

Obituary

Norman Hall died at Sharon, Penn., Sept. 29, aged 88 years. He was born in Pennsylvania, graduated from Dickinson College at Carlisle, and was for over 50 years engaged in mining iron ore and making pig iron, at Marietta, O., in Berks County, Penn., and in Mahoning and Shenango Valleys. In 1886, he was elected to Congress.

Edward H. Rising, ex-president and director of the General Chemical Co., died Wednesday in Saugerties, N. Y., at the age of 59 years. He was connected with the chemical industry during nearly all his business life, and was the founder of the National Chemical Co. in 1893, which was later merged with the General Chemical Co. He was made president of the latter company in 1907, and retired from business in 1910.

Herbert E. Goodman, vice-president and general manager of the Goodman Manufacturing Co., died on Oct. 3 at his home in Chicago. He was born in Chicago and graduated from Chicago University. In 1888 he became secretary of the Sperry Electric Mining Machine Co. and in 1893 became associated with the Thompson-Houston interests which absorbed the former company. He was an organizer of the Independent Electric Co., later taken over by the Link-Belt Machinery Co., Mr. Goodman going with the latter company. In 1900 he organized the Goodman Manufacturing Co. and took over the mining machinery business of the Link-Belt company.

Cortlandt E. Palmer, for a number of years one of the most active operating and consulting engineers in the country, died at his summer home in Arlington, Vt., Sept. 21, 1917, in his sixtieth year. He was born in New York, and educated at Johns Hopkins University and the Columbia School of Mines. He was graduated from the latter in 1878, and entered the employ of the engineer corps of the Pennsylvania Co. of Pittsburgh in 1879. In 1884 he removed to Colorado where at various times he operated well-known properties in Aspen, Rico, Cripple Creek and in other districts. He was general manager and vice-president of the Mollie Gibson Consolidated Mining and Milling Co., at Aspen, Colo., during the time this property made its famous production. His consulting engagements, embracing most of the Western states, were many and varied, including properties in Mexico. In 1903 he was appointed general superintendent of mines of the Guggenheim Exploration Co. and of the American Smelters Securities Co., and later became consulting engineer of the latter company, which post he filled for several years. He retired in 1910 from active consulting work.

Societies

Coming Meetings

American Iron and Steel Association..Cincinnati..Oct. 26-27
Electrical Exposition and Motor Show..New York..Oct. 10-20

American Foundrymen's Association—At the 22nd annual meeting held at Boston on Sept. 24-28, the following papers were among the many presented; "Micrometallography for the Foundry," Robert J. Anderson; "Theory of the Modern Waste Heat Boiler and Possible Application of Such Boilers to the Malleable Melting Furnace," A. D. Pratt; "Application of Pulverized Coal to the Air Furnace," W. R. Bean; "How Malleable Iron Has Improved," Enrique Touceda.

Southern Commercial Congress—Six of the bureaus of the Department of Commerce will have an exhibit at the Southern Commercial Congress, to be held in New York at the Hotel Astor on Oct. 15-17. Of chief interest to technical men will be the exhibit of the Coast and Geodetic Survey, which will consist largely of instruments used in surveying our coasts and placing of bench marks throughout the country. Some of these are a complete plane table alidade, and telemeter, chronographs, gimbal stand, geodetic level and rod, etc.

American Institute of Metals—At the recent meeting, held in Boston, the following officers were elected for the ensuing year: President, W. M. Corse, manager Titanium Bronze Co.; secretary and treasurer, Fred L. Wolf, manufacturing engineer, Ohio Brass Co., Mansfield, Ohio; vice-presidents, William B. Price, chief chemist Scovill Mfg. Co., senior vice-president; George K. Burgess, Bureau of Standards, Washington; H. J. Roast, James Robertson Co., Ltd., Montreal; J. P. Salter, Ohio Brass Co., Mansfield, Ohio; W. A. Cowan, National Lead Co., Brooklyn, N. Y.; H. S. Gulick, More-Jones Co., St. Louis; C. W. Johnson, Westinghouse Electric and Manufacturing Co.; H. A. Wentworth, American Zinc, Lead and Smelting Co., New York; F. L. Antisell, Raritan Copper Works, Perth Amboy, N. J.; G. M. Fritch, American Brass Co., Kenosha, Wis. The society has 282 active and 64 associate members, a total of 346 and an increase of 69 members. Twenty-eight corporations are now members, whereas last year only 19 were included. The society has adopted the plan of issuing a quarterly journal.

New Patents

United States patent specifications listed below may be obtained from "The Engineering and Mining Journal" at 25c. each. British patents are supplied at 40c. each.

Alumina and Zirconia, Composition Containing. Lewis E. Saunders and Ray Hill White, Niagara Falls, N. Y., assignors to Norton Company, Worcester, Mass. (U. S. No. 1,240,490; Sept. 8, 1917.)

Alunite—Production of Aluminate from Alunite. Paul Ralph Hershman, Chicago, Ill., assignor to Armour Fertilizer Works, Chicago, Ill. (U. S. No. 1,240,570; Sept. 18, 1917.)

Corrosion—Composition for Protecting Metallic Surfaces Against Corrosion. Don C. Westerfield, Dayton, and Edward J. Rogers, Miamisburg, Ohio. (U. S. No. 1,240,395; Sept. 18, 1917.)

Drill—Tool-Retainer for Hammer-Drills Lewis C. Bayles, Easton, Penn., assignor to Ingersoll-Rand Co., Jersey City, N. J. (U. S. No. 1,240,649; Sept. 18, 1917.)

Electric Furnace. David R. Knapp, Pottsville, Penn., assignor to the Eastern Steel Co., Pottsville, Penn. (U. S. No. 1,240,460; Sept. 18, 1917.)

Filter. Ernest J. Sweetland, Montclair, N. J. (U. S. No. 1,240,385; Sept. 18, 1917.)

Filtering Apparatus. George Sage Brooks and Lawrence Grant Duncan, Depue, Ill., assignors to New Jersey Zinc Co., New York, N. Y., a corporation of New Jersey. (U. S. No. 1,240,305; Sept. 18, 1917.)

Flotation of Minerals. Clement L. Perkins, Pittsburgh, Penn., assignor to Metals Recovery Co., New York, N. Y. (U. S. Nos. 1,240,597, 1,240,598, 1,240,599; Sept. 18, 1917.)

Gold-Saving Pan. Sherman L. Winchester, Weiser, Idaho. (U. S. No. 1,240,396; Sept. 18, 1917.)

Grinding Device. Francis M. Henshaw, Oklahoma, Okla. (U. S. No. 1,240,716; Sept. 18, 1917.)

Ingot Molds, Pouring-Head for. Charles L. Huston, Coatesville, Penn. (U. S. No. 1,240,722; Sept. 18, 1917.)

Mine Door. Charles W. Carman, Newburg, W. Va., assignor of one-half to Christiana Carman, Newburg, W. Va. (U. S. No. 1,240,541; Sept. 18, 1917.)

Ore Bodies, Method and Apparatus for Locating. Reginald A. Fessenden, Brookline, Mass., assignor to Submarine Signal Co., Waterville, Maine. (U. S. No. 1,240,328; Sept. 18, 1917.)

Rotary Pump. Fletcher C. Rood, Portland, Ore. (U. S. No. 1,240,489; Sept. 18, 1917.)

Rotary Pump. Jiles S. Shockley, Nashville, Tenn., assignor, by direct and mesne assignments, of ten one-hundredths to William L. Danley and eighty one-hundredths to Louis F. Butler, Nashville, Tenn. (U. S. No. 1,240,264; Sept. 18, 1917.)

Editorial Correspondence

SAN FRANCISCO—Oct. 6

State Railroad Commission Decision in the case of the complaint of Thomas Cain against the Mono Lake Lumber Co. has been rendered. Cain claimed that the road was a public utility and abandonment of the railroad would deprive him of facilities for transportation of ore. The decision rendered stated that, though the lumber company is a common carrier and subject to commission jurisdiction, the abandonment of the railroad between Bodie and Mono Mill is authorized. The reason for the decision was stated to be that though a public utility, the lumber company was the largest user and it is evident that the road could not be supported by the public.

Comstock Mines continue development of new ore in the lower levels. The Union on the 2300-ft. level made a fine showing in the last half of September, disclosing ore at various points showing favorable contents. On the 2400-ft. level, a vein six to 10 ft. wide was encountered and showed ore in commercial amount. In Ophir, the 2100-ft. level ore averages $11 to $13. Andes saved ore assaying $8.20. In the Gold Hill district, the Jacket is still getting low and medium-grade ore from the surface tunnel. In other mines on the lode, development work is being advanced and repairs are being made. Mexican mill has resumed work after being shut down for repairs and the new installations at the Jacket mill are in working order. Altogether the advancement on the Comstock during the last six months has been especially encouraging.

BUTTE—Oct. 6

Strike of Miners in Butte is practically broken. The smeltermen at Anaconda, who went on a strike to enforce a demand for a flat rate of pay, regardless of the price of copper, and also in sympathy with the Butte strikers, have returned to work. In fact, there are now more applicants for work at the smeltery than can be employed while the ore supply from the Butte mines remains short. While a large number of miners are still on a strike, the force is gradually breaking up. However, owing to the fact that several thousand miners have left the district, it will be many months before a full normal force will be working in the mines again.

Montana-Canadian Oil Co. has been taken over by Anaconda interests, represented by C. F. Kelley, vice president and managing director. The gas and oil lands of the company, situated along the Canadian border in Montana, in Hill and Toole Counties, are included. It is proposed to pipe the gas to Great Falls, Butte, Anaconda and other Montana communities, sell it for commercial and domestic purposes and use it as fuel at the smelteries of the Anaconda company. The Montana-Canadian has already developed two large gas-producing wells, and under the terms of the transfer, Mr. Kelley and associates will, within 30 days, begin sinking two other wells. They have already spent about $70,000 in development work on the lands and results justified them in taking over control of the property. It is estimated that it will require the expenditure of 14 to 15 millions of dollars to carry out the plans of the company and place it on a commercial footing. The Montana-Canadian company owns perpetual leases on 76,000 acres of oil lands. The company is capitalized for $1,000,000. Under the deal with Mr. Kelley and his associates the latter will organize two new companies, one a domestic concern for the purpose of developing and operating the land and wells, and the other, a foreign corporation, to construct the pipe lines and commercialize the products. What further capital will be required, aside from that realized from stock sales, will be raised by the issue of bonds. The development work, which is under way, will be continued and pushed to a point of thoroughly developing the property, but it is likely that the construction of the pipe lines will be delayed until after the war, as it is practically impossible to secure pipe now at any price. The impossibility of raising capital to carry out the gigantic project undertaken by the Montana-Canadian company made the deal with the Kelley interests advantageous and satisfactory to the stockholders of the Montana-Canadian company.

DENVER—Oct. 4

Leasing of Mineral Rights on state or school lands has been placed in the hands of the State Board of Land Commissioners. This board may lease any portion of the land of the state at a rental determined by it, and may collect the rental from the lessee and turn it over to the State Treasurer. In selling state lands for other purposes than mining, the board may reserve to the State of Colorado all rights to all minerals and ores, all coal, asphaltum, oil, gas or other like substances, for the purpose of mining, together with enough of the surface for the proper and convenient working of such minerals and substances.

Colorado School of Mines Alumni Association suit against Victor C. Alderson to prevent his election as president of the Institution, was decided by Judge James Cooper, when he upheld defendant's demurrer upon the ground that the plaintiffs are not affected as taxpayers, and therefore have no capacity to sue. The order, however, restraining the trustees from proceeding on contract entered into with Alderson, making him president, remains in effect for 20 days in order to give attorneys for the plaintiff time to take case before the Supreme Court. Prior to entering of judgment, the court consented to the amendment making Alderson a party to the suit.

Rights of Way Across Claims are provided for by an act of the last general assembly as follows: All claims shall be subject to the right of way of any ditch, flume, pipe line for transporting water or air for mining purposes, or any tram, tramway or pack trail, provided the parties desiring the right of way shall make just compensation to the owners of the claims. When the parties cannot agree upon the right of way and the amount of compensation to be paid to the owners of the claims, the same shall be determined in manner as now provided by law for the exercise of the right of eminent domain. Any ditch or flume shall be so constructed that the water therefrom shall not injure vested rights by flooding.

WALLACE, IDAHO—Oct. 6

Washington Water Power Company has found it necessary to add another transmission line to supply the demand for electric energy in the Coeur d'Alene district. The company now has two lines, one from its Spokane and one from its Post Falls plant, and announcement has just been made that a third line will be constructed from Post Falls. The two lines now in operation supply 10,000 hp. and the wires of the company reach almost every gulch in the district. Extensions are continuously being made, for electric power is now used almost exclusively for all purposes at the mines and mills, and practically every development company of any pretentions has a compressor driven by electricity. The largest single consumer of electric power is the Bunker Hill smeltery and the present and future demands of this plant has made the addition of a new line necessary.

Price of Explosives Is Advanced about every 30 days or six weeks. Notice is frequently served on consumers by the manufacturers to this effect, the last notice having been served by the local agency in this district on Sept. 17. The price of Dupont and Giant powder is now more than double the price before the war. Up to a certain point the advances were unquestionably justified on the ground of increased cost of production, but beyond that point they appear to be purely arbitrary and for no other purpose than to swell the profits of the manufacturers, which have already reached fabulous sums. The high cost of powder has now become a most serious matter in western mining districts. In this district, scores of development companies, which are financed by periodical assessments, have been forced to suspend operations on account of the excessive cost of powder, coupled with the advance in wages and mining supplies generally. The development of new mines is quite as essential as the steady operation of the old ones. Now that the productive mines have been forced to submit to a reduction in the prices of their product, they should be given the benefit of a reduction in the price of the material of which they are such large consumers, and which would be of direct encouragement in the opening of new mines. This phase of fixing the price of materials is important, as explosives can be justly considered a necessity inasmuch as they are directly concerned with metal production.

Change Rooms, with bathing facilities, at all mines was one of the propositions submitted for conference by the local of the International Union of Mine, Mill and Smelter Workers to the mining companies of Coeur d'Alene district. In view of all that has been done in that respect by the mining companies of the district, one wonders what these advocates of better working conditions would have. The change house at the Bunker Hill & Sullivan is a model; so is that at the Interstate-Callahan, at the Hecla, at the Hercules, and at the Morning, even while this request was being framed, construction of a modern dry room at the mill was well under way and plans were almost completed for a large concrete building at the mine which will be the last word in dry-room construction and conveniences; the plans for the change rooms at the mill include individual enameled wash basins, shower baths, and 85 individual lockers. The house is steam heated. The mine change house, work on which is just about to begin, will duplicate all the conveniences embodied in the dry room at the mill and will have accommodations for about 500 employees. A club house is to be erected at once, the plans for which will follow in general such institutions conducted by the Y. M. C. A. An architect is now preparing the plans. The club house will include reading room, writing room, gymnasium, billiard hall, entertainment hall, bowling alley and probably a plunge. The building will be for the free use of employees and under their direct management. The Bunker Hill & Sullivan maintains a similar institution, managed by the Y. M. C. A. Other companies, in addition to modern change-room accommodations, have similar institutions for the recreation of their men. In view of all that has been done by the companies for the welfare of their employees, the formal demand for "bathing facilities" is ludicrous to say the least.

JOPLIN, MO.—Oct. 6

A. I. M. E. Members will have the opportunity to visit a rich lead cave which has been found on the property of the Laclede Lead and Zinc company, about half mile west of Picher, Okla. The cave was struck at a depth of 200 ft. in the mill shaft and has been kept intact for the visiting members of the Institute.

Probability of Water Troubles in the two leading camps of this district in the near future is looming up. Until recently the water in the Webb City-Carterville sheet ground section was well under control, while the water in the Oklahoma field has always been a big problem. Now so many of the mills of the Webb City field are being shut down and moved to Oklahoma that it promises to leave a heavy burden of water pumping on those that remain. On the other hand, the increasing number of plants in the Oklahoma field has not only drained the water from the upper level, but has also removed it as far down as 300 ft. at many of the plants. Operators there who plan working the upper levels are planning the sinking of deep wells to supply water for the mills and boilers.

Decade of Mining Operations at Commerce, Okla., is marked by the renewal of the leases on the Emma Gordon tract recently. Emma Gordon became of age Sept. 4, 1907, and at once received her allotment of 160 acres right at Commerce. A lease upon the tract for 10 years was obtained by G. W. Bingham, of Miami, and A. H. Hatton, of Webb City, and after a hard fight with water, the tract has been a steady producer. Miss Gordon subsequently married an employee of Mr. Hatton, and it is as Mrs. Hiram McBee that she regrants the leases to the active companies on the tract, which include the Miami Lead and Zinc; Standifer Brothers, who are operating the old Emma Gordon mill; the old Prairie mine, operated now by C. Dawson, trustee; Haynes Mining Co., with two mills; and Worley & Co., who operate a tailing mill. The new lease, which was signed Sept. 4, extends for another 10 years.

Waco-Lawton Field, northwest of Joplin, is being extensively developed. There are only two mills now operating in the new part of this field, about two miles north of Lawton, Kan., and a mile west of Waco, Mo., but two others are being built while mill sites have been drilled out for eight more, which will be erected in the near future. The exceptional richness of the ore and extent of the ore face at the Waco Mining Co.'s property, where the mill was only recently placed in operation, has served to stimulate interest in the field. It was announced that C. H. Plumb and Edward Wilkins of Joplin, together with Oklahoma investors who were interested in the now highly successful Welsh mines at Century, Okla., have secured leases on 560 acres in the Waco-Lawton field and will carry on the most extensive drilling campaign the camp has yet seen. Plumb drilled out a number of the richest of the Oklahoma mines, including the Montreal, in which he is part owner, the Bilharz, the Kitty and the Veilie properties. Leases in the Waco-Lawton field are at a premium and it is believed the section will rival the Oklahoma field to a degree at least. Some good ore recoveries are being made as shallow as 145 ft., but the best runs are at a depth of about 300 ft. There will be some water to beat, but it is not expected to be exceptionally bad.

Activity in Extensions of the Field continues despite the unattractive ore market. J. Frank Haley, of Joplin, has announced the sale of leases on 1000 acres south of Miami, Okla., and 2500 acres, four miles west of Picher, Okla., to Tulsa and Cherryvale oil men for $30,000. Both tracts are in "wildcat" territory, but a small amount of drilling has shown some ore. An effort is to be made to develop a new field about five miles southwest of Joplin and extending almost to Lincolnville. M. H. Evans, of Joplin, and associates have leased 520 acres in this section and have subleased 440 acres with contracts for doing 9000 ft. of drilling. The development of the Lawton-Waco field continues and a good strike was reported this week two miles northeast of Waco, in new territory. Two miles west of the old Badger mines, in Cherokee County, Kan., much prospect drilling has indicated good orebodies. Five fine drill strikes have been made and 20 drill rigs are at work in a radius of two miles. Cosden, Curtis and Aiken Co., of Tulsa, which bought out the Admiralty Zinc Co.'s properties at Century, Okla., some time ago, is steadily transferring its interests from the sheet-ground field at Webb City to the new Oklahoma field. It will move the McDonald mill south of Webb City to Tar River soon. Its Red Bird mill has been shut down and will be sold or moved to Oklahoma, and its Queen Esther mill alone is now operating but will be closed down soon. W. B. Shackelford, of Carthage, is manager for the Tulsa oil operators, and frankly says there is small inducement to continue operations in the sheet-ground field at present ore prices.

TORONTO—Oct. 6

Canada Copper Co., in the development of their property at Copper Mountain, B. C., will involve an expenditure approximating $6,000,000 in the Southern Okanagan and Similkameen Valleys. In addition to the $2,500,000 which the company proposes to spend on opening up the mine on an extensive scale, the Kettle Valley Railway Co. will build a branch line from Penticton to Copper Mountain, through 14 miles of mountainous country, to provide ore transportation facilities at a cost of about $1,000,000. Power will be provided by the Kootenay Power Co., which will spend $2,500,000 in the construction of a high-tension power line from the end of its boundary system near Greenwood west to Copper Mountain.

Industrial and Scientific Research in Canada has received a further impetus by the action of the Canadian House of Commons, which has voted the sum of $91,600 for the recently established Bureau of Industrial and Scientific Research. Dr. McCallum, chairman, will devote his whole time and receive a salary of $10,000, the others giving their services gratuitously. It is proposed to select university students, allowing them $600 for the first year, and $750 the second year. Subsequently they may either continue their investigations in college or be transferred to industrial establishments. In this connection the University of Saskatchewan will undertake an investigation into the commercial possibilities of the Western coal fields.

EL PASO—Oct. 8

American Mining Companies in Mexico will be compelled to shut down according to a statement of an official of the American Smelting and Refining Co. unless the Carranza Government alters its attitude or the United States lifts its embargo on gold shipments. The Federal Reserve Board issued circulars to the effect that it will receive applications for arranging to supply amount of gold necessary for American companies to pay operating expenses in Mexico, and will allow the re-exportation of gold into Mexico during October, to give the Carranza government a chance to modify its order regarding the exportation of gold and silver. According to this order, reëxportation of refined gold taken out as bullion or concentrates must be made within 10 days. In the case of the A. S. & R. it requires 120 days for gold bullion to go through the refinery. It is also provided in the order of the Mexican government that 25% of the value of silver shipped out must be returned in gold. The State and Treasury Departments and Federal Reserve Board have taken the matter up with the Mexican government and it is thought possible that some favorable solution may be arrived at. It is believed that the Carranza order is designed to compel the United States to remove its embargo on gold. Professor Kemmerer, of Princeton University, is at present in Mexico endeavoring to work out a plan for silver coinage of Mexico.

'The Mining News'

ALABAMA

Calhoun County

SOUTHERN MANGANESE CORPORATION (Anniston)—Operating seven electric furnaces, making ferromanganese. Theodore Swann, president and manager. Main office, Birmingham, Ala.

Jefferson County

ALABAMA CO. (Gate City)—At Hammond Mine sinking its slope on Irondale seam at 2000-ft. depth. Seam is 5 ft. thick.

GULF STATES STEEL CO. (Gadsden)—A. L. Conner, works manager, announces bonus of 10%, effective Oct. 1, making bonuses 40%. Will affect about 3000 men.

WOODWARD IRON CO. (Bessemer)—On Oct. 1 employees' wages will be raised 10%, being third raise this year, affecting about 10,000 men. All plants operating to capacity.

ALASKA

KENNECOTT (Kennecott) — Production of copper for September amounted to 7,100,000 lb., compared with 7,148,000 lb. in August.

ALASKA GASTINEAU (Thane) — Reports fail to show any improvement in ore grade; decrease in tonnage due to labor shortage. Ore recovery in August averaged 99.4c. per ton against 98.5c. in July and an average yield of $1.15 per ton treated during preceding 2½ years.

ARKANSAS

Boone County

ARKANSAS-MISSOURI (Zinc) — Prospecting on two properties near Tar Kiln mine and Madison. Chas. La Vassuer, in charge.

PHILLIPS (Yellville) — Idle last year, resuming operations again.

GREAT EASTERN, ROZELLE (Yellville)—Located in Hall Mountain camp, started operations. A. J. Mossman, in charge.

LONNIE BOY (Rush)—Owned by Zimmermann and Schofield and associates. Development work in progress and small plant will be built this autumn.

BIG BUCK (Yellville)—Owned by Elmer Owens and associates. Developing lead orebody. Face opened up 40 ft. wide and 8 ft. deep.

ARIZONA

Maricopa County

MANGANESE DEPOSIT discovered southwest of Sentinel in Eagle Tank Mountains; ore reported to contain 44% Mn. J. D. Peggs, of Tucson, locator.

Mohave County

RATTLESNAKE (Chloride) — Recently shipped two cars of ore from 750-ft. level.

NEW MOWHAWK (Chloride)—Opening up high-grade ore in both shafts and shipping. Operating the Puzzle and Moose.

SCHENECTADY (Chloride)—Commercial ore 3 ft. wide opened in south drift on 175-ft. level. Plans to install electric hoist and pumping plant.

TOM REED (Oatman)—Bullion production for first half of September was over $31,000 and expect about same during last half. Aerial tramway expected to cut operating cost 10c. W. B. Phelps, mine superintendent.

Navajo County

APACHE R.R. CO. (Holbrook)—State Corporation Counsel granted permission to issue $1,000,000 bonds to build first 20 miles of road from here into Black Mesa Forest region. Road will be 71 miles long when completed and open important bituminous-coal deposits.

Pinal County

PINAL DEVELOPMENT (Kelvin)—Development in winze continues to open up good ore; shipping.

TROY-ARIZONA (Kelvin)—Fire recently destroyed building at pumping plant which supplies town with water. Loss was slight.

MAMMOTH (Mammoth) — Shaft-house and other surface buildings destroyed by fire entailing loss of $10,000 on Sept. 28. Mill shut down until temporary hoisting equipment installed.

HERCULES (Kelvin)—First unit of pumping plant to supply concentrator has arrived. About 60% of concentrator equipment is on ground.

SILVER BELLE (Price)—Taken over by Arizona Hercules interests and will begin shipping at once. Tonnage of lead-silver ore opened up.

U. S. VANADIUM (Kelvin) — Ground broken for 50-ton concentrator to be built by Minerals Recovery Co., of Denver. Spur to be built on Arizona-Eastern at Erman to facilitate transportation.

Santa Cruz County

ARIZONA EUROPEAN MINING CO. (Nogales)—Tunnel driven 100 ft. and shaft 60 ft. below tunnel level. Ore carries copper, silver, and gold; 8 to 12 in. high grade and 8 in. low grade. James Ritchie, formerly with R.R.R. mine, superintendent; Manuel Escalada, president; W. Schuckmann, treasurer.

Yavapai County

BLUE BELL (Mayer)—Drifting on 1200-ft. level to find orebody developed on 1000-ft. level with considerable chalcocite.

GREEN GULCH COPPER (Crown King)—O. L. Haberbush, in charge of property recently taken over by syndicate in El Paso.

VENTURE HILL (Jerome)—Operations resumed under E. L. Bartholomew. Shaft will be sunk 65 ft. to depth of 400 ft. below tunnel level or a total of 665 feet.

JEROME COPPER (Jerome)—Four-drill compressor, brought from Oatman in operation. Two shifts working. Formerly was the Ewing & Hooker group. T. G. Flynn, superintendent.

Yuma County

CACTUS QUEEN (Swansea) — H. H. Barbee, president and manager gone to Kansas City to arrange for purchase of machinery and motor trucks. Let contracts for 600 ft. of sinking before departure.

CALIFORNIA

Amador County

SOUTH KEYSTONE (Sutter Creek)—Development progressing from North Star shaft. H. Colpe, manager.

CENTRAL EUREKA (Sutter Creek)—Extensive development expected on 2540-ft. level. Extraction in progress on 2690-, 3425- and 3350-ft. levels. In last level, drifting north and south from shaft for known orebodies. Extracted 8455 tons, yielding $26,168 bullion and concentrates in July and August. Total expenditures amounted to $29,501, including $19,500 actual cost of mining and drilling; other cost included repairs to shaft, tailings dam and flume. Tailings reservoir almost completed.

Butte County

LUCK (Oroville)—Completed installation of 5-stamp mill on this property in Granite basin. Good ore reported.

Calaveras County

GARIBALDI (Oakland) — Permitted to issue 14,400 shares in exchange for claim and to sell shares for development.

Colusa County

CERISE (Willows)—Situated on Sulphur Creek. Mill destroyed by fire, rebuilt. Ore shows $10 gold per ton and amount of quicksilver said to equal milling cost. Large tonnage said to be blocked out. Preparations made to run during winter.

Contra Costa County

BUTTERS (Martinez) — Reported construction of zinc reduction works by Charles H. Butters, of Oakland, started. Report that Chabot aluminm dust laboratories would be removed from Oakland to Martinez denied. Zinc plant to occupy site of old Peyton Chemical Works.

Eldorado County

CHROME ore shipped from Volcanoville by Warren Green, of Georgetown. Two carloads from Northside in two weeks.

RISING HOPE (Placerville) — Crosscut driven toward lowest part of old channel bed for pay gravel. Nugget recently obtained weighs 1¼ oz.

Inyo County

CASA DIABLO (Bishop) — Acquired by John M. and C. Taylor, of Chicago.

Nevada County

GOLDEN CENTER (Grass Valley)—Reported good ore carrying gold disclosed on 500-ft. level in vein 2½ ft. wide.

OCEAN STAR (Washington) — Vein is said to be 6 ft. wide and to carry ore averaging $7 a ton. Being developed by Honolulu company. Development by 300-ft. shaft. Former operation through tunnel and ore sent to 20-stamp mill by aerial tram. Company owns power plant on river at short distance. Employing 30 men.

Placer County

PLACER COUNTY CHROME (Newcastle)—Machinery for new plant being hauled from the railroad to the mine near Lime Kiln. Expected to be immediately installed. R. H. Farmer, owner.

San Bernardino County

FRANC COPPER MINING CO. (Los Angeles)—Permitted to sell 427,500 shares capital stock to Dan Murphy for $15,000 cash. Mine in Kelso district.

San Diego County

INTERNATIONAL MAGNESITE CO. (Chula Vista)—Has chartered several steam schooners to bring raw material from Magdalena Bay, Baja California, to San Diego. Planned to import 1500 to 2000 tons per month.

Shasta County

LITTLE NELLIE (Redding)—Resumed operation after shutdown of two years. During that period diamond drills employed prospecting copper-bearing lenses. More than 30 holes drilled, with average depth of 800 ft. Result shows sulphides of 2 to 7% copper. The 15-stamp mill running on gold ore. Copper ore will be shipped to Mammoth smeltery at Kennett.

Siskiyou County

HAPPY CAMP DISTRICT activity renewed by completion of Copco dam on Klamath River for conserving water in reservoirs for mines. Placer locations being made for distance of 120 miles along the Klamath, from the confluence of Shasta River to Orleans Bar. Bears Copper mines on Indian Creek being developed, with Frank Swearingen, superintendent. Crumpton-Maddux opening good copper prospects; will work during winter. Tebbe copper mines, south of Indian Creek, doing assessment work. Davis Consolidated placers, largest in district, will resume work at once. Boorse, Green and Duck copper holdings will start work under contract with James B. Nesbit. Chrome being shipped from Callahan; 10 carloads was output last summer. Salmon River Mining Co. arranged for development of new ground and increasing number of workmen; ditches and flumes repaired and water system improved. O. H. Poor, superintendent. Bonally placer claims sold to Forks of Salmon Mining Co.

COLORADO

Boulder County

ST. JOE (Boulder)—This old Gold Hill mine will be reopened. Lead-zinc producer in past.

SLIDE (Boulder)—Mill operating satisfactorily. Flotation used; dump material being treated.

NEW SILVER STRIKE northwest of Carribeau Hill made recently. Stated ore shows good silver contents and 40% lead in 10-ft. discovery shaft.

Clear Creek County

HUDSON MILL (Idaho Springs)—New flotation unit being installed.

JACKSON MILL (Idaho Springs)—Plant running to capacity. Custom ore from Idaho Springs, Georgetown, Silver Plume and Central City being treated.

PRIMOS CHEMICAL CO. (Empire)—Contract let to drive 2000-ft. tunnel to cut 600 ft. under present workings at Camp Boericke molybdenum property.

Gilpin County

GOLD LODE (Central City)—Lease and bond taken. Shaft, orehouse and machinery overhauled.

GEIGER EXTENSION (Apex)—Development under way on this Michigan Hill property. Crosscut tunnel being driven to cut vein.

Lake County

ROBERT E. LEE (Leadville) — This Fryer Hill property shipping 40 tons silver ore daily. Produced zinc carbonate ore until recently; metal price caused change.

MATCHLESS (Leadville) — Long term lease secured. Shaft will be retimbered to its depth of 250 ft., and then sunk to second contact. Large producer in past. H. A. W. Tabor formerly interested.

Ouray County

CAMP BIRD (Ouray)—New tunnel in 7100 ft.

PAYMASTER (Ironton) — Lessees shipping copper-silver ore.

SARATOGA (Ironton)—Stated mine will be reopened by Boston men. Oxidized surface ore carrying gold and silver underlain by heavy pyrite ore. Mill remodeled three times in past but never obtained economical treatment of ore. Price of silver incentive to new operations.

Pueblo County

NORCROSS CHEMICAL CO. (Pueblo)—Will erect 50-ton sulphuric acid and 25-ton nitric acid plant to be known as Zurcher unit. Has secured 120 acres of land and contracted with Pratt Engineering and Machine Co., of New York, for construction of buildings.

Sagauche County

RAWLEY MINING CO. (Bonanza)—Contracted with Colorado Power Co. for 900 hp. of service for Shirley mill; power company reconstructing Salida plant and installing new turbine to handle additional load. Let contract to American Steel and Wire Co. for aerial tram seven miles long from mine to new mill at Shirley on D. & R. G. R.R.; capacity, 80,000 lb. ore per hour, in 6-cu.ft. buckets carrying 800 lb.

San Juan County

COLUMBUS (Animas Forks) — Driving crosscut tunnel to cut vein at 700-ft. depth.

BELCHER (Silverton)—Reopened by lessees. Good-grade copper-silver ore shipped.

NORTH STAR MILL (Silverton)—Operating steadily on Silver Lake ore and custom ore from Silverton and Red Mountain.

PLATA REY (Chattanooga)—First shipment silver-lead ore made. Leasing company operating Margie and Silver King claims of Telescope Mining Co. Development under way.

San Miguel County

MODENA (Telluride)—Shipping to Durango smeltery. Under development by lessees.

STANDARD CHEMICAL CO. (Placerville)—Shipping carnotite ore from Paradox Valley. Hauled in wagons to railroad at Placerville.

Teller County

BLUE FLAG GOLD (Cripple Creek)—At annual stockholders' meeting elected J. F. Eresman, president and general manager; J. J. Gunnell, vice-president; J. S. Pigall, secretary and treasurer. Recently resumed operations on Blue Flag, sinking main shaft from 1100- to 1400-ft. level. O. W. Bevan, superintendent.

JERRY JOHNSON (Cripple Creek)—Development on 650- and 750-ft. levels by Caley & Caley, lessees. A 2- to 4-in. streak of high-grade gold ore opened on 650-ft. level. Drift will be advanced on 750-ft. level to cut downward extension of this oreshoot.

IDAHO

Shoshone County

GIANT LEDGE (Murray)—Constructing 150-ton mill, with view to later doubling capacity. Lead orebody developed in shaft at 200 and 400-ft. levels.

CARNEY COPPER (Mullan) — Carload from tunnel No. 1 showed 6.19% copper. Crosscut from No. 3 tunnel being extended to cut ore shoot 350 ft. below No. 2. Will continue work all winter.

LOMBARDY MINING CO. (Kellogg)—Consists of 15 claims being surveyed for patent, lying one mile north of Kellogg. Completed 200-ft. shaft and drifting started. Orebody uncovered on tunnel level. Hoist, compressor and 16-cu.ft. skip already installed. Peter Albinola, president; H. O. Bemis, manager.

MISSOULA COPPER MINING CO. (Mullan)—Diamond drilling property since Sept. 10. Option formerly held by Snow Storm Mining Co. given up after expending $35,000 in opening up copper ore for 300 ft. but too low grade to warrant payment of $600,000 for property. Fault cut off orebody and then worked to east to find extension. Present operators believe orebody may be found to west.

MARYLAND

CHROME and MAGNESIA DEPOSITS being opened at Owings Mills in Baltimore County by J. H. Buxton, Jr., mining engineer. Reported chrome ore runs 45% and magnesite 38 in. wide of high quality. Using steam with electricity for lighting but expect to secure power later from Baltimore. Property prospected during last year. Expects to get out 40-ton carload daily within three months.

MICHIGAN

Copper

BEAR LAKE "POOL" (Calumet)—Diamond drilling stopped; entered soft ground, where caving occurred; will ressume soon.

LA SALLE (Calumet)—Back partly into Osceola lode of Osceola 45th level, with same high grades over 2900 ft. in from Osceola shaft No. 6.

OLD COLONY-MAYFLOWER (Houghton)—Two boilers from Elm River shipped to Old Colony-Mayflower plant. Remainder of plant being scrapped.

CALUMET & HECLA (Calumet)—Second unit in the leaching plant at the mills at Lake Linden being installed rapidly. New turbine installation progressing slowly.

RICHMOND (Adair)—Ore delivered to Milwaukee R.R. at Adair by aërial tramway. Is shipped crude, averages 6% copper and $1.50 gold. August shipments averaged carload per day.

NEW BALTIC (Houghton)—Drifted 20 ft. on new 8-ft. lode, 12 ft. west of shaft in good copper. May be New Arcadian lode; crosscut being driven to determine, but difficult as there are many lodes and it is 3000 ft. from New Arcadian shaft, the only other opening.

MINNESOTA

Mesabi Range

COOPER (Keewatin) — This property south of Bray mine being check drilled by Carlson Drill Co., of Hibbing, for M. A. Hanna & Company.

DUNWOODY (Chisholm)—Controlled by Tod-Stambaugh interests, shipped 280,000 tons and will continue until navigation closes. Crews will then remove taconite rock in pit.

NORTH UNO (Hibbing)—Operated by Hanna Ore Co. Tearing out gasoline hoist installed few years ago and replacing by electrically operated one: current from Great Northern Power Company.

SCRANTON (Hibbing)—Let contract to Winston-Dear Co. for stripping. Unable to get equipment so will not work till next spring. Overburden will be hauled several miles south of site just purchased for this dump. Pickands Mather Co., operators.

NEWPORT MINING CO. (Grand Rapids)—With another operator has taken six months option lease on several properties. Formerly leased by the Oliver Iron Mining Co., who withdrew when they dropped Great Northern and other properties after having proved up ground. Later leased by Interstate Iron Co., who quit at outbreak of war owing to unsettled conditions. Two drills now on property.

MISSOURI

Joplin District

J. P. CLARK, (Mexico, Mo.)—Purchased for $50,000 a 40-acre lease in Oklahoma just south of Baxter Springs, on Bingham land. Tract has good drill record.

KANOAK METAL (Picher, Okla.)—Building 350-ton mill south of Picher, on proved lease. A. M. Gaines, Joplin, general manager.

REPUBLIC (Tar River, Okla) — Will build mill on lease in Tar River. Shaft down and in ore. Headquarters, Miami, Okla. H. E. Huttig, manager.

GOLDEN EAGLE (Baxter, Kan.) — Building 350-ton mill south of Kansas-Oklahoma line, northeast of camp of St. Louis. To be steam plant with usual equipment.

CARTHAGE (Carthage)—Incorporated with $32,000 to develop recent lease, northeast of Picher, Okla. Charles Turner, Joplin, and Emma Knell, Carthage, principals.

VACATION (Joplin)—Opening up old mine, two miles east of Duenweg. Extensive drilling campaign shows ore. Mill will be erected. W. O. Cragg and A. W. Canada, of Joplin, managers.

L. P. BUCHANAN (Joplin)—Bought for $75,000 lease of Acme Mining Co. at Lawton, Kan., and will sink shaft from 150-ft. level to 250-ft. and replace 150-ton mill now on tract with 400-ton plant. Also during past week purchased for $70,000 lease just north of Beaver mine, west of Picher, Okla., from E. M. Meirs, of Salina, Kan. Shaft down to 250 ft. will be sunk deeper immediately and 400-ton mill built.

MERRILL (Baxter, Kan.)—Completing plant north of Quapaw, Okla. The 350-ton mill has three seven-cell rougher jigs and seven-cell cleaner and five-cell sand jig; power furnished by Fairbanks-Morse oil engines, first in the district; sludge department of 18 tables; Dorr thickener and classifier; regrinding rolls and 90-in. classifying screen. Has built club house and a 40-room hotel for workers. Has leased 120 acres and will build several more mills when this is in operation. W. E. Merrill, principal owner and general manager.

MONTANA

Cascade County

NEIHART DISTRICT silver properties, inoperative for last 15 years due to low price of silver, being reopened by C. D. McLure of Philipsburg, present owner. To clear up arrear taxes, county officials ordered treasurer to accept total of original tax, amounting to $6798.

Beaverhead County

ELKHORN DISTRICT RAILROAD route will soon be graded and ready for tracklaying. Road will be narrowgage due to impossibility of securing standard rails. Will cross Wise River near Churchill ranch, above Dewey, and then follow river up to Elkhorn mines.

Silver Bow County

CLARK-MONTANA REALTY (Butte)—Hearing of injunction asked against Butte & Superior ordered by Federal District Court continued from Oct. 19 to Nov. 12.

CORBIN INDEPENDENT MINING CO. (Butte)—Filed articles of incorporation with county recorder, Oct. 1. Capitalization, $400,000. Directors are August Bechtold, Gust Schultz and Oscar Lang.

ANACONDA (Butte)—Rather than continue all Butte mines with crews below normal, closed Diamond and Rarus mines on Oct. 9 and transferred Diamond crew to the Mountain Consolidated to bring production in latter almost up to normal. Rarus crew transferred to Mountain View pending completion of repair work in Rarus shaft. The result will be that two mines are working normally instead of four with sub-normal crews. Present output averages 11,000 tons ore a day and expect to reach normal Oct. 31. Sale of Alice property to company upheld by court.

NEVADA

Humboldt County

NEVADA PACKARD MINES CO. (Packard, via Lower Rochester)—Equipped with 100-ton cyanide plant. H. G. Thompson, general superintendent.

Mineral County

CALAVADA (Luning)—Opened oxidized orebody on 1000- and 1100-ft. levels on contact of monzonite and limestone. Extensive work done in last three years and considerable ore shipped. Sulphide ore with precious metal contents on fault contact on 1000-ft. level. Ore will be shipped to Mason Valley smeltery. H. A. Geisendorfer, in charge.

Nye County

TONOPAH ORE PRODUCTION for week ended Sept. 29 amounted to 9519 tons, valued at $166,582, comparing with 9388 tons the previous week. Producers were: Tonopah Belmont, 2454 tons; Tonopah Mines, 2550 tons; Tonopah Extension, 2380 tons; Jim Butler, 850 tons; West End, 1095 tons; Rescue, 127 tons; Midway, 63 tons.

TONOPAH EXTENSION MINING CO. (Tonopah)—Receipts from operations for August amounted to $113,914; current expenses, $84,855; operating profit, $29,058.

WHITE CAPS (Manhattan)—East orebody exposed on fifth level. Hanging wall side first struck by south crosscut. After drifting 25 ft. along vein, course changed to cut ore at right angles and so far no sign of foot wall.

MANHATTAN CONSOLIDATED MINES DEVELOPMENT CO. (Manhattan)—Cutting fourth station, timbers all in and lateral work from fourth level started. Pump for third-level seepage into shaft installed at fourth level and 15-ft. sump below level. Third level south crosscut driven to strike downward extension of free milling orebody explored west and south of present working shaft. Fourth level east drift being made to strike east orebody developed at 200- and 300-ft. level, should encounter according to survey 250 ft. from shaft.

NEW MEXICO

Grant County

LAWRENCE (Lordsburg)—Drifting by contract with Trendt & Hughes from No. 2 shaft to connect with No. 1 and No. 3. Will erect mill. I. T. Dewey, manager.

EIGHTY FIVE (Lordsburg)—Constructing mill to use flotation process. Dam being built near power house for mine water. Grading for spur from Arizona and New Mexico R.R. J. W. Crowdus, in charge of construction. A. J. Interrieden, general manager.

Otero County

SACRAMENTO COPPER CO. (Tularosa)—Churn drilling on property.

TWIN BUTTES COPPER CO. (Tularosa)—Filed articles of incorporation at Santa Fe, Sept. 21. Capitalization, $2,000,000. R. L. Davenport, Tularosa, agent.

Sierra County

KINGSTON, HILLSBORO AND LAKE VALLEY DISTRICTS, stimulated by high silver price. Producers in past.

Santa Fe County

SANTA FE GOLD DREDGING CO. (Golden)—Expects to begin operations by December. Employing 50 men.

OREGON

Josephine County

GREENBACK (Grants Pass)—Fire at this gold mine destroyed tool house; supposed that cause was tree falling on power wire making short circuit. Operators using hand drills until power is advanced. F. F. Childers, manager.

SOUTH DAKOTA

Custer County

PRINGLE QUARRY (Pringle) — Shipments of limestone being made to plants of Western Sugar Beet Co.

SPOKANE LEAD AND SILVER (Custer)—Work started on erection of concentrator for low-grade lead-silver ores. High-grade ore being shipped to smeltery.

CRAWFORD MICA MINING AND MILLING (Custer)—Work resumed at Old Mike mine and new oil engine and compressor installed. One car of mica shipped to Chicago and will make regular shipments of one car per week.

UTAH

Beaver County

MILFORD COPPER (Milford)—Full force employed and developing considerable tonnage. Work on new railroad spur progressing, about half the grading completed. Expect to reach 200-ton output per day shortly, at present producing 80 to 90 tons.

Juab County

DESERT MOUNTAIN (Tintic)—Main vein tapped on crosscut from new shaft on 300-ft. level. Drifts will be run north and south on 300-ft. level and every 100 ft. thereafter. Level stoping will be done when this work is completed.

Tooele County

POTASH BRINE in area near southwest end of Great Salt Lake, at Grant, is being worked by the Diamond Match Co. Plant installed to treat the brine obtained from dry sink. In operation, but details of output not available. Brine reported to be low in potash but free from objectionable associations.

CANADA

British Columbia

CONSOLIDATED MINING AND SMELTING COMPANY OF CANADA (Trail)—Operating three copper furnaces, smelting 1000 tons of ore per day, most of which supplied by Rossland mines. Coke supply improving. J. Buchanan, smeltery superintendent.

New Brunswick

COPP COPPER MINE (Midway, Albert Co.)—Henry A. Copp and Sons gave option on property to J. D. Hubbard, of Chicago, representing a syndicate. Price is $750,000, option running nine months while prospecting property. Owners to receive 25% of returns from ore shipped. Stated ore carries high percentage copper and veins are of some length.

Ontario

SILVER QUEEN (Cobalt)—Leased and shipping.

LAKE SHORE (Kirkland Lake)—Constructing 75-ton mill.

BOSTON HOLLINGER (Boston Creek) Installing development plant.

KIRKLAND PORPHYRY (Kirkland Lake)—Offering of 100,000 shares for development oversubscribed.

ASSOCIATED GOLD FIELDS (Larder Lake)—Main shaft on Maxwell side of property down 430 ft. Mill to be enlarged.

TEMISKAMING (Cobalt) — Considering flotation treatment of old tailings, estimated to contain over 600,000 oz.

SCHUMACHER (Schumacher) — For month ended Sept. 15 treated 3400 tons, recovering $23,000 of bullion.

BEAVER (Cobalt) — Statement quarter ended Aug. 31 shows cash on hand, $49,972; ore and bullion and due from smelters, $158,477.

CROESUS (Munro Township) — Water difficulties overcome. Developing on lower levels. Milling operations again normal, heads running $40 per ton.

McINTYRE (Schumacher)—Only Porcupine mine showing gain for last year. Report for 15 months ended June 30 shows $840,554 profit.

CANADIAN KIRKLAND (Kirkland Lake)—Shaft on No. 2 vein down 25 ft.; vein is whole width of shaft and assays show gold content. Will sink to depth. No. 1 vein uncovered for about 400 ft. and good surface showings encountered.

MEXICO

LABOR TROUBLES occurred in Tampico oil fields when employees of Aguila Oil Co. refused to work, demanding a 50% increase in wages. The government instructed Governor General Ricaut to take precautions to avoid disorder. I. W. W. and German agents reported to have instigated strike. [Later—Dispatches dated Oct. 9 report strike settled and men promised to return to work immediately. Governor Ricaut present with strong force of troops.]

CIA DU BOLEO (Santa Rosalia, Baja Calif.)—Production for August amounted to 1,433,040 lb. of copper. Average grade was 3.23%.

HERMOSILLO COPPER CO. (Sonora)—Incorporated in Mexico with $1,500,000 capitalization, being reorganization of Verde Grande Copper Co. Shipped ore for test to flotation-machinery manufacturers. Main office, Columbus, Ohio. J. L. Zimmerman, president.

NICARAGUA

GRECIA MINES CO. (Leon)—This gold-silver mine is being operated by the Butters Salvador Mines interests. Supplies brought in through port of Corinto, by rail to Leon, thence by trail to mine.

SALVADOR

BUTTERS SALVADOR MINES (San Sebastian)—Recently paid first liquidation dividend; ore reserves about exhausted but small additional discoveries have extended life of mine somewhat. Has operated about 15 years. British company began paying dividends in 1902-3; operation highly profitable; reorganized as Canadian company in 1912. Stockholders receiving shares in the new Grecia mine in Nicaragua. Affiliated Divisadero company not operating at present, owing to power difficulties.

CHILE

BRADEN (Sewell)—Production of copper for September amounted to 5,348,000 lb. comparing with 4,512,000 lb. in August or an increase of 836,000 lb.

PERU

CERRO DE PASCO (La Fundición)—Production of copper for September amounted to 7,041,000 lb., comparing with 6,036,000 lb. in August. September output establishes a new high record.

The Market Report

SILVER AND STERLING EXCHANGE

Oct.	Sterling Exchange	Silver New York, Cents	Silver London, Pence	Oct.	Sterling Exchange	Silver New York, Cents	Silver London, Pence
4	4.7530	92⅛	46¾	8	4.7525	90⅛	45⅞
5	4.7525	91⅛	46¼	9	4.7525	89⅛	45⅜
6	4.7525	90⅜	46	10	4.7525	88⅛	45⅛

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London quotations are in pence per troy ounce of sterling silver, 925 fine.

DAILY PRICES OF METALS IN NEW YORK

Oct.	Copper Electrolytic	Tin Spot.	Lead N. Y.	Lead St. L.	Zinc St. L.
4	*23½	60½	7⅛ @8	7.60 @7.90	7⅛ @8⅛
5	*23½	60½	7⅛ @8	7.60 @7.90	7⅛ @8⅛
6	*23½	60½	7⅛ @8	7.60 @7.90	7⅛ @8⅛
8	*23½	61¼	7⅛ @7⅞	7⅛ @7⅞	7.80 @8.00
9	*23½	61	7⅛ @7⅞	7⅛ @7⅞	7.80 @8.00
10	*23½	61	7⅛ @7⅞	7⅛ @7⅞	7.80 @8.00

* Price fixed by agreement between American copper producers and the U. S. Government, according to official statement for publication on Friday, September 21, 1917.

The above quotations (except as to copper, the price for which has been fixed by agreement between American copper producers and the U. S. Government, wherein there is no free market) are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for the deliveries constituting the major markets, reduced to basis of New York, cash, except where St. Louis is the normal basing point.

The quotations for electrolytic copper are for cakes, ingots and wirebars.

We quote electrolytic cathodes at 0.05 to 0.10c. below the price of wirebars, cakes and ingots.

Quotations for spelter are for ordinary Prime Western brands. We quote New York price at 17c per 100 lb. above St. Louis.

Some current freight rates on metals per 100 lb. are: St. Louis-New York 17c.; St. Louis-Chicago, 6.3c.; St. Louis-Pittsburgh, 13.1 cents.

LONDON

Oct.	Copper Standard Spot	Copper Standard 3 Mos.	Copper Electrolytic	Tin Spot	Tin 3 Mos.	Lead Spot	Zinc Spot
4	110	110	125	245½	243	30½	54
5	110	110	125	245½	243½	30½	54
6							
8	110	110	125	244½	243½	30½	54
9	110	110	125	244½	242½	30½	54
10	110	110	125	244½	244	30½	54

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2,240 lb. For convenience in comparison of London prices, in pounds sterling per 2,240 lb., with American prices in cents per pound the following approximate ratios are given, reckoning exchange at $4.75½. £30½ = 6.474c.; £54 = 11.462c.; £120 = 25.473c.; £137 = 29.082c.; £240 = 50.946c. Variations, £1 = 0.212277c.

Metal Markets

NEW YORK—Oct. 10

The market generally continued dull. The outstanding features were the pronounced weakness of lead and a decidedly softer tone in spelter. Conditions in the copper business continued chaotic, but the Committee of Producers is working to develop a practicable system for carrying on business, and is receiving general cooperation.

Copper, Tin, Lead and Zinc

Copper—Government specifications were slow in coming forward, and therefore, in spite of a substantial requisition by the Allies, the Committee of Producers thought that they could release some copper to domestic manufacturers, and did so. The effort of the Copper Producers' Committee is to supply domestic manufacturers with all the copper that is possible and is necessary to maintain the supply of essential articles into which copper enters. The committee hopes that it is going to be able to supply enough to keep the wheels going.

Copper Sheets are quoted at 35c. per lb. for hot rolled, and 1c. higher for cold rolled. Wire is quoted nominally at 31c. per lb., f.o.b. mill.

Tin—This market was rather quiet, but a fair amount of business was done from day to day. At the close, Straits tin was quoted at 61c. and Banka at 59¼@59½c.

Imports of tin and terne plates into the United States for the fiscal year ended June 30, 1917, were only 1,370,462 lb., being 425,391 lb. less than in 1916, and 47,507,485 lb. less than in 1915. Exports for the year were the largest ever known, being 521,861,390 lb., against 516,257,463 lb. in 1916, and 105,899,762 lb. in 1915.

Lead—This market was distinctly weaker, the metal being offered at 7⅛c.. New York, with some round lots reported sold at about that figure. The transactions reported for the week aggregated a fairly large tonnage, the bulk of which was represented, however, in relatively few transactions.

Our Washington correspondent reported, under date of Oct. 10, that the Government has arranged with the lead producers that the settling price on Government business for lead for October shall be the St. Louis price quoted by "Engineering and Mining Journal," subject, however, to a maximum of 8 cents.

Zinc—A fair volume of transactions in 100-ton lots was done during the week. During the first three days practically all the business reported was at 8c., but in the latter part offerings at that price became so free that other sellers reduced their price.

Zinc Sheets—Price of zinc sheets has not been changed. Market is still at $19 per 100 lb. f.o.b. Peru, Ill., less 8% discount.

Other Metals

Aluminum—This metal continues weak and dull, though stocks are light. We quote 40@41c. for small lots of No. 1 ingots at New York.

Antimony—Extremely dull and slightly weaker. We quote 15@15½c. for spot. The quotation for futures is rather nominal at 15c., c.i.f., in bond.

Bismuth—Unchanged at $3.50 per pound.

Cadmium—This metal is quoted at $1.45 @1.55 per pound.

Nickel—Steady at 50c. per lb., premium of 5c. per lb. for electrolytic.

Quicksilver—A decline in the market has not stimulated buying. Some sales were made at $100, which we quote as the market. San Francisco reports by telegraph $102.50, barely steady.

Gold, Silver and Platinum

Silver—This market has been a receding one owing to the absence of buyers on China account. Shipments to London direct continue light, as so much has been placed ahead, and deliveries here are to fill old contracts. The market closed at 88⅞c. in New York.

Mexican dollars at New York: Oct. 3, 71c.; 4, 70c.; 5, 69c.; 6, 68¾c.; 8, 68¼c.; 9, 68c.

Coined silver in the United States on Sept. 1 is reported by the Treasury Department as follows: Standard dollars, $568,270,061; subsidiary coins, $200,837,387; total, $769,107,448. Of the dollars $473,468,062 are held in the Treasury against silver certificates outstanding.

Platinum—A fair business was reported at $103@105.

Palladium—We quote $115@125.

Zinc and Lead Ore Markets

Joplin, Mo., Oct. 6—Blende, per ton, high, $76.15; basis 60% Zn, premium $75@70; medium to low, $67.50@60; calamine, per ton, basis 40% Zn, $38@35; average selling price, all grades of zinc, $62.92 per ton.

Lead, high, $90; basis 80% Pb, $90@80; average selling price, all grades of lead, $86.94 per ton.

Shipments the week: Blende, 7890 tons; calamine, 272 tons; lead, 1129 tons. Value, all ores the week, $611,760.

Electric-power troubles have caused all mines using electric power to reduce use of current one-third, with a number of most recent contracts temporarily suspended. Low water and disabled generators are given as the cause. The hydro-electric company is getting in position it was a year ago. In accepting new contracts, prior to the installation of increased power equipment, the overloaded plant has given away. This will operate to lower production about 25% for several weeks.

Platteville, Wis., Oct. 6—Blende, basis 60% Zn, $67 base for premium ore down to $62 base for medium grade. Lead ore, basis 80% Pb, $80 per ton. Shipments reported for the week are 3704 tons of zinc ore, 28 tons of lead ore, and 813 tons of sulphur ore. For the year to date the figures are: 110,971 tons of zinc ore, 5044 tons of lead ore, and 21,703 tons of sulphur ore. Shipped during week to the separating plants, 3468 tons of zinc ore.

Other Ores

Molybdenum Ore—Unchanged at $2.20 per lb. on the basis of 90% molybdenum sulphide.

Pyrites—Spanish lump quoted at 15c. per unit on basis of 10s. ocean freight, buyer to pay war risk, express freight and any duty. Ocean freights are 35s. for northern ports, 40s. for south Atlantic and 42s. 6d. for Gulf ports. Some concessions have been expected in ocean freights for several weeks, but have not yet materialized.

Tungsten Ore—We quote high-grade wolframite unchanged at $23@25.

Tungsten ore production of Tavoy, Burma, for the six months ended June 30 is reported at 1639 tons of concentrates.

Iron Trade Review

NEW YORK—Oct. 10

With the leading iron and steel makers in conference with the War Industries Board, a further announcement of agreed prices may be expected at any moment. What will interest the trade nearly as much as prices, says *Iron Age*, is the extent to which there will be a realignment of basing points and other changes in trade practices. The sweeping recommendations proposed in fixing pig-iron prices at the same figure for all furnaces are conspicuously epochal. Whether finished steel will be quoted at equal figures for Chicago as well as Pittsburgh is a question; it was not, it appears, discussed at the meetings in Washington out of which came the price promulgation on Sept. 24.

New buying in steel is still negligible. With the announcements from time to time of fresh and enlarged Government building programs, the trade is coming to accept the attitude of mills in refusing further commitments for the time being, for, in addition to the direct Government needs, it is recognized that the effect passes through the ramifications of the industry to the provisions of plant extensions and the building of machinery and apparatus. Pig-iron production statistics have shown how difficult it is, with fuel and labor shortage, to increase the basic output.

PITTSBURGH—Oct. 9

Since the beginning of last week the manufacturers in the different branches of the steel trade have been in conference for the purpose of arriving at a schedule of prices to be submitted to the War Industries Board, covering such unfinished steel as billets, slabs and sheet bars and the important finished steel products the prices of which were not fixed at the time of the original agreement. This agreement set bars at 2.90c., shapes at 3c. and plates at 3.25c., while prices for wire products, tubular goods, sheets, etc., were to be fixed in relation to these other finished products. While the manufacturers have not formally met the War Industries Board, in connection with these conferences, they have been furnished some information as to what Washington had in mind and this has resulted in their scaling down some of the prices that it was originally expected to submit. Tomorrow there will be the formal conference between the War Industries Board and the manufacturers. If a schedule is agreed upon between them it will go to the President for consideration. No formal announcement therefore is to be expected for several days at the earliest. The blast-furnace men sent their views to Washington a week ago, covering the matter of differentials between grades as well as differentials between districts, all referable to the basis price originally agreed upon of $33 for foundry, malleable and basic iron at valley furnaces.

Market transactions have been extremely light both in the products for which prices are already fixed and in those for which prices are still to be fixed. With few exceptions producers have cheerfully adopted the prices fixed but as they are already well sold up they are indisposed to sell at this time. There has been little demand, except for small lots for early deliveries, and these could hardly be furnished, irrespective of price.

There has been a marked further decrease in the volume of specifications filed against finished steel contracts, which suggests that the rate of consumption of steel products is decreasing. A fortnight ago a prominent authority predicted that within 60 days orders for 7,000,000 tons of steel would be placed on behalf of the Government and its Allies. Orders thus far have not been much heavier than formerly, and while the 7,000,000 tons will doubtless be placed the time will probably be longer than predicted.

Pig Iron—Practically all the blast furnaces assert that they are ready to supply pig iron on the basis fixed, when the pig iron is really needed, but they are reserved about making actual sales when they are already so well sold up, and when they have many contracts at higher prices, for their making sales would encourage the holders of the higher priced contracts to seek a revision or cancellation. Small transactions have occurred, and there appear to be few consumers who are under the necessity of making purchases just at the moment. There appears to be a better supply of pig iron than was supposed. We quote basic, malleable at the fixed price of $33, valley, and bessemer at the tentative price of $36.30, valley, prices delivered Pittsburgh being 95c. higher.

Steel—The rumor now going the rounds of the trade that the manufacturers will submit at Washington prices of $55 for billets and $57 for sheet bars is an old one, it having since been decided to submit lower prices, as there was reason to believe the War Industries Board was disposed to ask for prices below $50. The last billet sale reported was at $60, ten days or more ago.

Ferroalloys

Ferromanganese—The market has become practically nominal, because it is expected prices will be set by agreement with the Government at materially lower levels than those recently ruling, about $375 for prompt and $350 for contract.

The production of spiegeleisen and ferromanganese in the United States in the nine months ended Sept. 30 was 341,229 tons.

Coke

Connellsville—The Priority Board has ordered a 100% car supply for the Connellsville coke region, this order to take precedence even over the priority order in favor of lake coal. This may help production somewhat, but labor is so scarce as to prevent any large increase. Sales at the $6 price are increasing, but are still of relatively small volume, as producers are filling up their contract customers. Foundry coke is not selling at all as the differential has not been established and it could be sold only at $6.

STOCK QUOTATIONS

N. Y. EXCH.†	Oct. 9
Alaska Gold M.	3⅛
Alaska Juneau	2
Am.Sm.& Ref.,com.	91½
Am. Sm. & Ref., pf.	107
Am. Sm. Sec., pf., A	95
Am. Sm. Sec., pf. B.	‡93
Am. Zinc	16½
Am. Zinc, pf.	52½
Anaconda	67½
Batopilas Min.	1
Bethlehem Steel	85
Bethlehem Steel, pf.	88
Butte & Superior	21½
Cerro de Pasco	32½
Chile Cop.	16½
Chino	46½
Colo.Fuel & Iron	39½
Crucible Steel	67
Dome Mines	8
Federal M. & S.	14¼
Federal M. & S., pf.	40
Great Nor., ore ctf.	30½
Greene Cananea	40
Gulf States Steel	91
Homestake	102
Inspiration Con.	48½
International Nickel	31½
Kennecott	33½
Lackawanna Steel	79
Miami Copper	31½
Nat'l Lead, com.	49
National Lead, pf.	102
Nev. Consol.	18½
Ontario Min.	5½
Quicksilver	1
Quicksilver, pf.	1½
Ray Con.	23
Republic I.&S.,com.	77½
Republic I. & S., pf.	99½
Sloss-Sheffield	40
Tennessee C. & C.	13½
U. S. Steel, com.	105½
U. S. Steel, pf.	115½
Utah Copper	85
Va. Iron C. & C.	56

N. Y. CURB†	Oct. 9
Big Ledge	2½
Butte & N. Y.	⅛
Butte C. & Z.	8
Butte Detroit	⅛
Caledonia	.65
Calumet & Jerome	1½
Can. Cop. Corpn.	1½
Carlisle	4
Cashboy	.06
Con. Ariz. Sm.	2
Con. Coppermines	8
Con. Nev.-Utah	.06½
Emma Con.	⅛
First Nat. Cop.	2½
Goldfield Con.	.35
Goldfield Merger	‡.05
Greenmonster	.75
Hecla Min.	7
Howe Sound	5
Jerome Verde	1⅛
Kerr Lake	5½
Louisiana	.75
Magma	43
Majestic	.35
McKinley-Dar-Sa.	60
Milford	1½
Mohican	⅛
Mother Lode	.31
N. Y. & Hond.	13
Nipissing Mines	8½
Ohio Cop.	1
Ray Hercules	3½
Richmond	.57
Rochester Mines	.48
St. Joseph Lead	17½
Standard S. L.	⅛
Stewart	⅛
Success	.14
Tonopah	6
Tonopah Ex.	2
Tribullion	⅛
Troy Arizona	.15
United Cop.	.50
United Verde Ext.	34½
United Zinc	3½
Utica Mines	.21
Yukon Gold	2

SAN FRAN.*	Oct. 9
Alta	.03
Andes	.10
Best & Belcher	.02
Bullion	.01
Caledonia	.10
Challenge Con.	.01
Confidence	.05
Con. Virginia	.15
Gould & Curry	‡.01
Hale & Norcross	.03
Jacket-Cr. Pt.	.08
Mexican	.15
Occidental	.80
Ophir	.07
Overman	.04
Savage	.03
Seg Belcher	‡.02
Sierra Nevada	.16
Union Con.	.72
Utah Con.	.01
Belmont	4.00
Jim Butler	.85
MacNamara	.17
Midway	.10
Mont.-Tonopah	‡.18
North Star	‡.09
Rescue Eula	.16
West End Con.	.65
Atlanta	.08
Booth	.05
Comb. Frac.	.02
D'field Daisy	.02
Florence	.12
Jumbo Extension	.16
Kewanas	.08
Nevada Hills	.12
Nevada Packard	.22
Round Mountain	.25
Silver Pick	.12
White Caps	1.22½
Big Jim	‡.62½
United Eastern	3.75

BOSTON EXCH.*	Oct. 9
Adventure	1¼
Ahmeek	93
Algomah	.25
Alloues	60
Ariz. Com., ctfs.	10½
Arnold	.25
Bonanza	.21
Butte-Balaklava	.40
Calumet & Ariz.	71
Calumet & Hecla	500
Centennial	14½
Copper Range	50½
Daly West	2
Davis-Daly	4½
East Butte	10½
Franklin	5½
Granby	75
Hancock	12
Hedley	‡17
Helvetia	.25
Indiana	1½
Isle Royale	29½
Keweenaw	2
Lake	7
La Salle	3
Mason Valley	6½
Mass	7
Mayflower	1½
Michigan	1½
Mohawk	76
New Arcadian	2½
New Idria	11
North Butte	15
North Lake	‡.95
Ojibway	1½
Old Dominion	43
Osceola	80½
Quincy	80
St. Mary's M. L.	64
Santa Fe	1
Seneca	7
Shannon	5½
Shattuck-Ariz.	22
So. Lake	2½
So. Utah	.18
Superior	7
Superior & Bost.	3½
Trinity	5
Tuolumne	1⅛
U. S. Smelting	54½
U. S. Smelt'g, pf.	48½
Utah Apex	3
Utah Con.	14
Utah Metal	3½
Victoria	3
Winona	2
Wolverine	38½
Wyandot	.70

BOSTON CURB*	Oct. 9
Alaska Mines Corp.	.37
Bingham Mines	11½
Boston Ely	.70
Boston & Mont.	.59
Butte & Lon'n Dev.	.12
Calaveras	2½
Calumet-Corbin	.01
Chief Con.	2½
Cortez	.10
Crown Reserve	.26
Crystal Cop.	.74
Eagle & Blue Bell	2½
Houghton Copper	.75
Intermountain	1½
Iron Cap, Com.	15½
Iron Cap Cop., pf.	15½
Mexican Metals	.30
Mines of America	1½
Mojave Tungsten	.46
Nat. Zinc & Lead	.35
Nevada-Douglas	1⅛
New Baltic	1½
New Cornelia	16½
Oneco	.28
Pacific Mines	.35
Rex Cons.	.12

SALT LAKE*	Oct. 8
Bannack	.26
Big Four	.01
Cardiff	4.50
Colorado Mining	.13
Daly	1.70
Daly-Judge	7.90
Empire Copper	1.27½
Gold Chain	.17
Grand Central	.55
Iron Blossom	.87
Lower Mammoth	.03
May Day	.05½
Moscow	.11
Prince Con.	1.00
Silver-King Coal'n	2.97
Silver King Con.	3.90
Sioux Con.	.04
So. Hecla	.90
Tintic Standard	1.47½
Uncle Sam	.04
Wilbert	.25
Yankee	.08

TORONTO*	Oct. 8
Adanac	.16
Bailey	.05
Beaver Con.	.36½
Chambers Ferland	.12
Coniagas	3.80
Hargraves	.11
La Rose	.43½
Peterson Lake	.10
Right of Way	‡.05
Temiskaming	.32
Wettlaufer-Lor.	.07
Dome Exten.	.12
Dome Lake	.14
Foley O'Brien	‡.60
Hollinger	5.10
McIntyre	1.40
Newray	.60
Porcu. Crown	.40
Schumacher	‡.42
Teck-Hughes	.42
Vipond	.25
West Dome	.16

STOCK QUOTATIONS—Continued

COLO. SPRINGS	Oct. 9
Cresson Con.	5.37½
Doctor Jack Pot.	.03
Elkton Con.	.03½
El Paso	.15
Gold Sovereign	.02½
Golden Cycle	1.90
Granite	.40
Isabella	.08
Mary McKinney	.02½
Portland	1.48
United Gold M.	.15
Vindicator	.48

LONDON	Sept. 25		
Alaska Mexican	£0	5s	0d
Alaska Tre'dwell	1	0	0
Burma Corp.	4	3	1½
Cam. & Motor.	0	10	0
Camp Bird	0	10	6
El Oro	0	11	3
Esperanza	0	10	0
Mexican Mines	6	6	3
Nechi, pfd.	0	13	9
Oroville	0	18	9
Santa Gert'dis.	0	16	0
Tomboy	0	18	6

* Bid prices. † Closing prices. ‡ Last Quotations.

MONTHLY AVERAGE PRICES OF METALS

Silver	New York			London		
	1915	1916	1917	1915	1916	1917
Jan.	48.855	56.775	75.630	22.731	26.960	36.682
Feb.	48.477	56.755	77.585	22.753	26.975	37.742
Mar.	50.241	57.935	73.861	23.708	27.597	36.410
April	50.250	64.415	73.875	23.709	30.662	36.963
May	49.915	74.269	74.745	23.570	35.477	37.940
June	49.034	65.024	76.971	23.267	31.060	39.065
July	47.519	62.940	79.010	22.597	30.000	40.110
Aug.	47.163	66.083	85.407	22.780	31.498	43.418
Sept.	48.680	68.515	100.740	23.591	32.584	50.920
Oct.	49.385	67.855	.....	23.925	32.361	.....
Nov.	51.714	71.604	.....	25.094	34.192	.....
Dec.	54.971	75.765	.....	26.373	36.410	.....
Year	49.684	65.661	.....	23.675	31.315	.....

New York quotations cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

Copper	New York		London			
	Electrolytic		Standard		Electrolytic	
	1916	1917	1916	1917	1916	1917
Jan.	24.008	28.673	88.083	131.921	116.167	142.895
Feb.	26.440	31.750	102.667	137.895	133.167	148.100
Mar.	26.310	31.481	107.714	136.750	136.000	151.000
April	27.895	27.935	124.319	133.842	137.389	147.158
May	28.625	28.788	135.457	130.000	152.522	142.000
June	26.601	29.962	112.432	130.000	137.455	142.000
July	23.865	26.620	95.119	128.409	125.500	140.409
Aug.	26.120	25.380	110.283	122.391	126.304	137.000
Sept.	26.855	25.073	113.905	117.500	134.071	135.250
Oct.	27.193	.....	122.750	.....	142.523	.....
Nov.	30.625	.....	134.659	.....	155.432	.....
Dec.	31.890	.....	145.316	.....	162.842	.....
Year	27.202	.....	116.059	.....	138.281	.....

Tin	New York		London	
	1916	1917	1916	1917
January	41.825	44.175	175.548	185.813
February	42.717	51.420	181.107	198.974
March	50.741	54.388	193.609	207.443
April	51.230	55.910	199.736	220.171
May	49.125	63.173	196.511	245.114
June	42.231	62.053	179.466	242.083
July	38.510	62.570	168.357	242.181
August	38.565	62.681	169.870	243.978
September	38.830	61.542	171.345	244.038
October	41.241	.....	179.307	.....
November	44.109	.....	186.932	.....
December	42.635	.....	183.368	.....
Av. year	43.480	.....	182.096	.....

Lead	New York		St. Louis		London	
	1916	1917	1916	1917	1916	1917
January	5.921	7.626	5.826	7.530	31.167	30.500
February	6.246	8.636	6.164	8.595	31.988	30.500
March	7.136	9.199	7.375	9.120	34.440	30.500
April	7.630	9.288	7.655	9.158	34.368	30.500
May	7.463	10.207	7.332	10.202	32.967	30.500
June	6.938	11.171	6.749	11.123	31.011	30.500
July	6.352	10.710	6.185	10.644	28.137	30.500
August	6.244	10.594	6.088	10.518	29.734	30.500
September	6.810	8.680	6.699	8.611	30.786	30.500
October	7.000	.....	6.898	.....	30.716	.....
November	7.042	.....	6.945	.....	30.500	.....
December	7.513	.....	7.405	.....	30.500	.....
Year	6.853	.....	6.777	.....	31.359	.....

Spelter	New York		St. Louis		London	
	1916	1917	1916	1917	1916	1917
Jan.	16.915	9.619	16.745	9.449	89.810	48.329
Feb.	18.420	10.045	18.260	9.875	97.762	47.000
Mar.	16.846	10.300	16.676	10.130	95.048	47.000
April	16.695	9.459	16.525	9.289	99.056	54.632
May	14.276	9.362	14.106	9.192	94.217	54.000
June	11.752	9.371	11.582	9.201	68.591	54.000
July	8.925	8.643	8.755	8.473	50.750	54.000
Aug.	8.730	8.360	8.560	8.190	51.587	54.000
Sept.	8.990	8.136	8.820	7.966	52.095	54.000
Oct.	9.829	.....	9.659	.....	54.159	.....
Nov.	11.592	.....	11.422	.....	56.023	.....
Dec.	10.665	.....	10.495	.....	55.842	.....
Year	12.804	.....	12.634	.....	72.071	.....

New York and St. Louis quotations, cents per pound, London, pounds sterling per long ton.

Pig Iron, Pitts.	Bessemer‡		Basic‡		No. 2 Foundry	
	1916	1917	1916	1917	1916	1917
January	$21.60	$35.95	$18.78	$30.95	$19.70	$30.95
February	21.16	36.37	18.93	30.95	19.51	30.95
March	21.81	37.37	19.20	33.49	19.45	35.91
April	21.65	42.23	18.95	38.90	19.45	40.06
May	21.78	46.94	19.11	42.84	19.58	43.60
June	21.95	54.22	18.95	50.05	19.34	50.14
July	21.95	57.45	18.95	53.80	19.20	53.95
August	21.95	54.17	18.95	50.37	19.22	53.95
September	22.88	46.40	19.58	42.24	19.53	48.58
October	24.61	.....	21.26	.....	21.51	.....
November	30.07	.....	28.18	.....	26.55	.....
December	35.16	.....	30.95	.....	30.79	.....
Year	$23.88	.....	$20.98	.....	$21.15	.....

‡ As reported by W. P. Snyder & Co.

Current Prices—Materials and Supplies

IRON AND STEEL

SHEETS—Quotations are in cents per pound in various cities from warehouse, also the base quotations from mill:

Blue Annealed	Large Lots, Pittsburgh	St. Louis	Chicago	San Francisco	New York
No. 10	8.00	10.05	10.00	11.00	10.00
No. 12	8.05	10.10	10.05	11.05	10.05
No. 14	8.10	10.15	10.10	11.10	10.10
Black					
Nos. 18 and 20	7.80	10.15	9.80	11.07	10.30
Nos. 22 and 24	7.85	10.20	9.85	11.12	10.35
No. 26	7.90	10.25	9.90	11.12	10.40
No. 28	8.00	10.35	10.00	11.57	10.50
Galvanized					
No. 10	8.50	10.95	10.70	....	10.80
No. 12	8.60	10.95	10.70	12.15	10.90
No. 14	8.60	10.95	10.70	12.15	10.90
Nos. 18 and 20	8.90	11.15	11.00	12.45	11.25
Nos. 22 and 24	9.05	11.30	11.15	12.59	11.55
No. 26	9.20	11.45	11.20	12.74	11.70
No. 28	9.50	11.75	11.50	13.03	12.00

STEEL RAILS—The following quotations are per 100 lb. f.o.b. Pittsburgh and Chicago for carload or larger lots. For less than carload lots 5c. per 100 lb. is charged extra:

	Pittsburgh Oct. 8, 1917	Pittsburgh One Year Ago	Chicago* Oct. 8, 1917	Chicago* One Year Ago
Standard bessemer rails	$38.00 to 60.00	$33.00	$38.00	$33.00
Standard openhearth rails	40.00 to 60.00	35.00	40.00	35.00
Light rails, 8 to 10 lb.	83.00	50.00	95.00	43.00
Light rails, 12 to 14 lb.	82.00	49.00	95.00	42.00
Light rails, 25 to 45 lb.	75.00	47.00	95.00	40.00
Rerolled rails	75.00 to 80.00	....	....	....

TRACK SUPPLIES—The following prices are base per 100 lb. f.o.b. Pittsburgh for carload lots, together with the warehouse prices at the places named:

	Pittsburgh Oct. 8, 1917	Pittsburgh One Year Ago	Chicago	St. Louis	San Francisco	Dallas
Standard railroad spikes	$7.00	$2.65	$5.00	$5.75	$7.25	$5.75
Track bolts	7.00 to 8.00	3.25	6.25	Premium	8.80	Premium
Standard section angle bars	3.75 to 4.00	2.00	4.50	Premium	4.65	Premium

STRUCTURAL MATERIAL—The following are the base prices f.o.b. mill, Pittsburgh, together with the quotations per 100 lb. from warehouses at the places named:

	*Pittsburgh	New York Oct. 8, 1917	New York 1 Yr. Ago	St. Louis	Chicago	San Francisco	Dallas
Beams, 3 to 15 in.	($3.00)	$5.25	$3.35	$5.05	$5.00	$7.75	$6.00
Channels, 3 to 15 in.	(3.00)	5.25	3.35	5.05	5.00	7.75	6.00
Angles, 3 to 6 in., ¼ in. thick	(3.00)	5.25	3.35	5.05	5.00	7.75	6.00
Tees, 3 in. and larger	(3.00)	5.30	3.40	5.05	5.05	7.75	6.00
Plates	(3.25)	10.00	4.00	10.05	10.00	10.50	9.00

*Government price.

RIVETS—The following quotations are per 100 lb.:

STRUCTURAL

	Mill, Pittsburgh	Warehouse New York	Chicago	St. Louis	San Francisco	Dallas
¾ in. and larger	$5.25	$7.00	$5.50	$5.55	$7.15	$8.50

CONE HEAD BOILER

¾ in. and larger	5.35	7.10	5.60	5.65	7.25	8.60
⅝ and ⅞	5.50	7.25	5.75	5.80	7.40	8.65
½ and ⅝	5.85	7.60	6.10	6.15	7.75	9.00

Lengths shorter than 1 in. take an extra of 50c. Lengths between 1 in. and 2 in. take an extra of 25c.

HORSE AND MULE SHOES—Warehouse prices per 100 lb. in cities named:

	Mill, Pittsburgh	Cincinnati	Chicago	St. Louis	Denver	Birmingham
Straight	$4.75	$6.75	$7.00	$7.00	$7.75	$7.00
Assorted	4.90	7.25	7.25	7.15	8.00	7.50

WIRE ROPE—Discounts from list price on regular grades of bright and galvanized are as follows:

	New York	St. Louis	Chicago	San Francisco
Galvanized	10—2½%	10—2½%	10—2½%	15%
Bright	20—2½%	20—2½%	20—2½%	10%

SWEDISH (NORWAY) IRON—This material per 100 lb. sells as follows:

	Oct. 8, 1917	One Year Ago
New York	$14.00	$6.00
Cleveland	15.00	6.30
Chicago	13.50	5.50

In coils an advance of 50c. usually is charged.
Note—Stock scarce generally.

PIPE—The following discounts are for carload lots f.o.b. Pittsburgh, basing card in effect July 2, 1917, for iron, and May 1 for steel:

BUTT WELD

Steel Inches	Black	Galvanized	Iron Inches	Black	Galvanized
¾ to 3	49%	35½%	¾ to 1½	33%	17%

LAP WELD

2	42%	29½%	2	26%	12%
2½ to 6	45%	32½%	2½ to 4	28%	15%
7 to 12	42%	28½%	4½ to 6	28%	15%
13 and 14	32½%	....	7 to 12	25%	12%
15	30%	....			

BUTT WELD. EXTRA STRONG PLAIN ENDS

¾ to 1½	47%	34½%	¾ to 1½	33%	18%
2 to 3	48%	35½%			

LAP WELD. EXTRA STRONG PLAIN ENDS

2	40%	28½%	2	27%	14%
2¼ to 4	43%	31½%	2¼ to 4	29%	17%
4½ to 6	42%	30½%	4½ to 6	28%	16%
7 to 8	38%	24½%	7 to 8	20%	8%
9 to 12	35%	19½%	9 to 12	15%	2%

From warehouses at the places named the following discounts hold for steel pipe:

	Black New York	Black Chicago	Black St. Louis
¾ to 3 in. butt welded	38%	41.9%	34.27%
3½ to 6 in. lap welded	18%	37.9%	21.27%
7 to 12 in. lap welded	10%	....	21.27%

	Galvanized New York	Galvanized Chicago	Galvanized St. Louis
¾ to 3 in. butt welded	22%	26.9%	19.27%
3½ to 6 in. lap welded	List	23.9%	13.27%
7 to 12 in. lap welded	List + 20%	....	6.27%

Malleable fittings, Class B and C, from New York stock sell at 5 and 5% from list prices. Cast iron, standard sizes, 34 and 5%.

MISCELLANEOUS

FLOTATION OILS—Prices of oils for flotation, in cents per gallon, in barrels:

	New York	Chicago	Denver In Bbl. Lots	Denver In Carload Lots
Pure steam-distilled pine oil	$0.50½	$0.45	$0.30	$0.27
Pure destructively distilled pine oil	.40	.43	.30	....
Pine tar oil	.28½	.30	.24½	.19
Crude turpentine	.37	.47	.44	.38
Hardwood creosote	.19½*	.....	.34½	.31

*F.o.b. Cadillac, Mich.

SODIUM CYANIDE—New York price is 37c. per lb.; Denver, 46c. to 43c.; in Chicago, 65c.

SODIUM SULPHIDE—In New York the price per pound is 4c. to 4¼c. for concentrated, 2¼c. to 2½c. for crystals. The Denver price for concentrated is quoted at 3½c. The Chicago price is 3½c. Concentrated comes in 500-lb. drums, the crystals in 400-lb. barrels.

ZINC DUST—New York price is 18c. per lb. in 1600-lb. barrel; Chicago, 18c.

CALCIUM CARBIDE—Price f.o.b. cars at warehouse points east of Mississippi River (except in Alabama, Georgia and Florida) is $90 for Cameo, $95 for Union. In territory between Mississippi River and the Rockies and in Alabama, Georgia and Florida, add $5; west of Rockies, add $10 to $15.

LINOLEUM—In 50-sq.yd. rolls in carload lots the price is 88c. per square yard, for concentrating tables.

HOSE—

Fire

	50-Ft. Lengths
Underwriters' 2½-in.	70c. per ft.
Common, 2½-in.	40–10%

Air

	First Grade	Second Grade	Third Grade
¾-in. per ft.	$0.55	$0.30	$0.25

Steam—Discounts from list

First grade... 30% Second grade... 30-5% Third grade... 40-10%

RUBBER BELTING—The following discounts from list apply to transmission rubber and duck belting:

Competition ..... 50–10% Best grade 25%
Standard 40%

LEATHER BELTING—Present discounts from list in the following cities are as follows:

	Medium Grade	Heavy Grade
New York	40%	35%
St. Louis	45%	40%
Chicago	40—5%	35—10%
Birmingham	35%	35%
Denver	40%	35%

RAWHIDE LACING—40%.

MANILA ROPE—For rope smaller than ½-in. the price is ½ to 2c. extra; while for quantities amounting to less than 600 ft. there is an extra charge of 1c. The number of feet per pound for the various sizes is as follows: ½-in., 8 ft.; ¾-in., 6; ⅞-in., 4½; 1-in., 3½; 1¼-in., 2 ft. 10 in.; 1½-in., 2 ft. 4 in. Following is price per pound for ½-in. and larger, in 1200-ft. coils:

Boston	$0.34	Kansas City	$0.33½
New York	.33½	Los Angeles	.30
Chicago	.31½	Seattle	.33½
St. Paul	.34	Denver	.34

PACKING—Prices per pound:

Rubber and duck for low-pressure steam	$0.77
Asbestos for high-pressure steam	1.54
Duck and rubber for piston packing	.88
Flax, regular	.66
Flax, waterproofed	.99
Compressed asbestos sheet	.99
Wire insertion asbestos sheet	1.21
Rubber sheet	.55
Rubber sheet, wire insertion	.88
Rubber sheet, duck insertion	.44
Rubber sheet, cloth insertion	.25
Asbestos packing, twisted or braided, and graphited, for valve stems and stuffing boxes	1.10
Asbestos wick, ½- and 1-lb. balls	.65 to .70

FIRE BRICK—Quotations on the different kinds in the cities named are as follows, f.o.b. works:

	New York	Chicago
Silica brick, per 1000	$50.00 to 55.00	$55.00 to 60.00
Fire clay brick, per 1000, No. 1	45.00 to 55.00	.....
Magnesite brick, per net ton	135.00 to 145.00	.....
Chrome brick, per net ton	135.00	.....
Deadburned magnesite brick, per net ton	85.00 to 90.00	.....
Special furnace chrome brick, per net ton	60.00 to 70.00	60.00 to 80.00

Standard size fire brick, 9 x 4½ x 2½ in. The second quality is $4 to $5 cheaper per 1000.
St. Louis—High grade, $55 to $65; St. Louis grade, $40 to $50.
Birmingham—Fire clay, $25 to $30; Denver, $23, per 1000.

RAILWAY TIES—For fair-size orders, the following prices per tie hold:

	Material	7 in. x 9 in. by 8 Ft. 6 In.	6 in. x 8 in. by 8 Ft.
New York	Yellow Pine	$1.32	$1.06 to 1.11
St. Louis	No. 1 White Oak	1.00	.75
Chicago	White Oak	.97	.82
Chicago	Creosoted	1.30	1.15
San Francisco	Green	.97	.74
San Francisco	Creosoted	1.85	1.37

GREASES—Prices are as follows in the following cities in cent sper pound for barrel lots:

	New York	Denver	Chicago	Birmingham	St. Louis
Cup	5 to 7	9½	7½	5½	5.6
Fiber or sponge	5 to 7	15	7¾	12½	5.9
Transmission	5 to 7	13	6¼	12½	5.9
Axle	3 to 7	5	5	4½	3.3
Gear	4 to 5	4½	6½	10½	6
Car journal	5½ to 7¼	4	6	9	3.75

WIPING CLOTHS—In Cleveland the jobbers' price per 1000 is as follows:

13¼ x 13¼ ..... $35.00 13¼ x 20½ $45.00

In Chicago they sell at $30 to $33 per 1000.

COTTON WASTE—The following prices are in cents per pound:

	New York		Cleveland	Chicago
	Oct. 8, 1917	One Year Ago		
White	11.00 to 12.00	12.50	16.00	14.00 to 15.00
Colored mixed	8.50 to 12.00	9.00	14.00	10.00 to 12.00

LINSEED OIL—These prices are per gallon:

	New York		Cleveland		Chicago	
	Oct. 8, 1917	One Year Ago	Oct. 8, 1917	One Year Ago	Oct. 8, 1917	One Year Ago
Raw in barrels	$1.23	$0.73	$1.30	$0.77	$1.27	$0.75
5-gal. cans	1.33	.83	1.40	.87	1.37	.85

WHITE AND RED LEAD in 500-lb. lots sell as follows in cents per pound:

	Red				White			
	Oct. 8, 1917		1 Year Ago		Oct. 8, 1917		1 Yr. Ago	
	Dry	In Oil	Dry	In Oil	Dry and In Oil	Dry and In Oil
100-lb. keg	12.25	12.50	10.50	11.00	12.00	10.50
25- and 50-lb. kegs	12.50	12.75	10.75	11.25	12.25	10.75
12½-lb. keg	12.75	13.00	11.00	11.50	12.50	11.00
1- to 5-lb. cans	14.25	14.50	12.50	12.50	14.50	12.50

NUTS—From warehouse at the places named, on fair-sized orders, the following amount is deducted from list:

	New York		Cleveland		Chicago	
	Oct. 8, 1917	One Year Ago	Oct. 8, 1917	One Year Ago	Oct. 8, 1917	One Year Ago
Hot pressed square	List	$1.50	$1.65	$2.75	$3.00	$3.25
Hot pressed hexagon	List	1.50	1.50	2.75	3.00	3.25
Cold punched square	List	1.00	1.25	2.50	1.50	3.00
Cold punched hexagon	List	1.50	1.25	3.00	1.50	3.50

Semifinished nuts sell at the following discounts from list price:

	Oct. 8, 1917	One Year Ago
New York	50%	50—10%
Cleveland	45%	60%
Chicago	50%	60%

MACHINE BOLTS—Warehouse discounts in the following cities:

	New York	Cleveland	Chicago
¾ by 4 in. and smaller	30%	35%	40—10%
Larger and longer up to 1 in. by 30 in.	15%	25%	35—5%

WROUGHT WASHERS—From warehouses at the places named the following amount is deducted from list price:

New York ..... $1.00 Cleveland ..... $3.80 Chicago $4.00

For cast-iron washers the base price per 100 lb. is as follows:

New York ..... $5.00 Cleveland ..... $4.50 Chicago $3.50

EXPLOSIVES—Price per pound in small lots at cities named:

	Low Freezing	Gelatin			Black
	20%	40%	60%	80%	Powder
New York	.....	$0.26½	$0.34½	.....	$2.50*
Boston	.....†	.....†	.36¼	$0.43¾	....
Kansas City	$0.20	.26¼	.33¼	.43¼	....
New Orleans	.....	.25¼	.30¼	.....	....
Los Angeles	.19	.25	.32¼	.....	....
Seattle	.37	.49½	.63½	.83½	....
Chicago	.18¾	.22¾	.32¼	.42	....
St. Paul	.20	.26¼	.33¼	.....	2.55*
St. Louis	.16¼	.20¼‡	.29½	.39½	2.55*
Denver	.19	.25¼	.32¼	.42¼	....
Dallas	.25	.29	.39	.49	....

*25-lb. kegs. †No local demand. ‡45%.

FUEL OIL—Price variable, depending upon stock. New York quotations not available owing to this fact. In Chicago and St. Louis the following prices are quote:

	Chicago	St. Louis
Domestic light, 22-26 Baume	7¾c.	8.5c.

Note—There is practically no fuel oil in Chicago at present time.

OILS—Price per 50-gal. bbl. is as follows:

City	Fuel	Black	Red Engine	Steam Cylinder	Gasoline
New Orleans	$5.00	$7.75	$9.50	$16.30	$11.25
Seattle	4.40	6.25	11.00	21.00	10.25
Denver	2.87	8.25	15.50	23.00	12.00
Los Angeles	1.45	6.50	12.00	26.00	10.00
Denver	2.87	8.25	15.50	23.00	12.00
St. Paul	3.00	5.50	11.00	17.50	10.05
Cincinnati	5.00	5.50	10.50	17.00	12.00
Boston	5.25	8.00	12.50	18.75	12.50
Kansas City	6.95	4.35	10.35	17.35	10.15

Note—Standard prices of oil are necessarily difficult to give Those above are for average grades.

CONSTRUCTION MATERIALS

ROOFING MATERIALS—Prices per ton f.o.b. New York or Chicago:

	Carload Lots	Less Than Carload Lots
Tar felt (14 lb. per square of 100 sq.ft.)	$61.00	$62.00
Tar pitch (in 400-lb. bbl.)	15.00	16.50
Asphalt pitch (in barrels)	29.00	30.50
Asphalt felt	60.00	62.00

PREPARED ROOFINGS—Standard grade rubbered surface complete with nails and cement costs per square as follows in New York and Chicago:

	1-Ply		2-Ply		3-Ply	
	c.l.	l.cl.	c.l.	l.cl.	c.l.	l.cl.
No. 1 grade	$1.15	$1.40	$1.45	$1.60	$1.75	$1.90
No. 2 grade	1.10	1.25	1.25	1.40	1.50	1.65

Asbestos asphalt saturated felt (14 lb. per square) costs $5.35 per 100 lb.
Slate-surfaced roofing (red and green) in rolls of 108 sq.ft. costs $1.85 per roll in carload lots and $2.10 for smaller quantities.
Shingles, red and green slate finish, cost $4.75 per square in carloads, $5 in smaller quantities, in Philadelphia.

HOLLOW TILE—

	4x12x12	8x12x12	12x12x12
Boston	$0.0957	$0.171	$0.2266
Kansas City*	.0595	.1125	.1575
Denver	.09	.17	.25
New Orleans	.0892	.1417	.1863
Los Angeles*	.05	.10	.165
Chicago	.07	.135	...

*In quantities of 1000.

LUMBER—Price per M in carload lots:

	8 x 8-in. x 20 Ft. and Under				12 x 12-In., 20 Ft. and Under	
	Y.P.	Fir	Hemlock	Spruce	Y.P.	Fir
Kansas City	$39.00	$34.00	$34.00	....	$45.00	$34.00
Seattle	21.00	21.00	21.00	$21.00	21.00	21.00
Los Angeles	....	30.00	30.00	....	....	30.00
San Francisco	....	24.00	24.00	....	....	24.00
St. Paul	....	38.00	31.50	....	....	43.00
Denver	....	30.00	....	27.50	....	32.00

	1-In. Rough, 10 In. and Under			2-In. T. and G. 10 In. x 16 Ft.	
	Y.P.	Fir	Hemlock	Y.P.	Fir
Kansas City	$43.00	$43.50	$42.00	$51.00	....
Seattle	21.00	21.00	21.00	21.00	$21.00
Los Angeles	30.00	30.00	....	....	24.00
San Francisco	....	24.00	24.00	....	24.00
St. Paul	....	51.00	34.00	59.00	57.50
Denver	....	30.00	30.00	....	30.00

PORTLAND CEMENT—These prices are for barrels in carload lots, including bags:

	Oct. 8, 1917	One Month Ago	One Year Ago
New York	$2.22	$2.22	$1.72
Jersey City	2.16	2.16	1.60
Boston	2.77	2.77	1.92
Chicago	2.21	2.31	1.86
Pittsburgh	2.31	2.31	1.81
Cleveland	2.44	2.44	1.94
Denver	3.20	3.20	...
Los Angeles	2.30	2.40	...

LIME—Warehouse prices:

	Hydrated per Ton		Lump per 300-Lb. Barrel	
	Finished	Common	Finished	Common
New York	$16.50	$13.25	$2.10	$1.90
Chicago	15.00	12.00	1.90	....
St. Louis	12.00	10.75	....	....
Dallas	20.00	15.00	....	....
San Francisco	18.00	....	1.65	....